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EDITORIAL NOTES.

Prepayment Meter Law.

IN last week's number of the "JOURNAL," a letter was published (which came to hand too late for any comment to be made upon it in that issue), in which, while the writer was kind enough to express agreement in theory with our remarks on the Longton prepayment meter case, he pointed out the great difficulty which would, in his judgment, be experienced in putting the views advanced by us into practice. In the article referred to, we used the word "expediency;" and, of course, our correspondent's opinions of what is expedient may be different from our own. We may not be able to convince him that he is in error; and, unless he can adduce more powerful arguments than those contained in his letter last week, he certainly will not persuade us that we are in the wrong. It was stated, as clearly as possible, what seemed to us, in a given set of circumstances, to be the most politic course for gas suppliers to pursue; but it must be left for each manager to decide for himself how far, in his particular instance, it is wise for him to follow this advice. Put briefly, the broad principle for which we contend is that where, without any negligence being shown on the part of the consumer, money disappears from a prepayment meter, the gas suppliers should—as when there is no agreement the High Court has held that they must—bear the loss. Does our correspondent not think it would have been better for all gas undertakings to have graciously conceded (as many did) the right of consumers to consideration in this matter, than to have waited until compelled to do so at the point of the legal bayonet? But evidently he does not. For him the era of "conciliation" has not yet arrived, though many undertakings find such a policy very much more profitable than that of "irritation," to which some people (apparently our correspondent among them) still cling with a tenacity worthy a better cause.

We agree with our correspondent that the Longton decision need not cause disquietude on the part of gas managers, seeing that some have long ago realized the fairness of the principle established by it, and acted accordingly, even when they may have thought that the law would have warranted their taking a different view of the matter. These undertakings have not come to grief in consequence; so there is no reason why others should, when obliged to follow their example. And then, as is pointed out, the suppliers can safeguard themselves by adopting the common expedient of an agreement making the consumer responsible for these losses, which could be enforced when absolutely necessary—say, when the same meter had been robbed two or three times, and there was very good reason to believe (but not absolute legal proof) that the consumer himself had taken the money or had connived at its abstraction. To such cases as these, our plea for generous treatment, where agreements exist, did not apply; for we said that consumers "must be made to take every reasonable care of the meter, "and when they fail to do so, there is no hardship whatever in forcing them to take the consequences." A man who robs his own meter, or knowingly permits someone else to do so, cannot be held to be taking reasonable "care" of it. But these instances cannot be of such frequent occurrence as to seriously threaten the profits of the automatic branch of a gas undertaking.

Then, again, we would point out to our correspondent (though it should be unnecessary, seeing that he signed his letter "Lex") that when the consumer himself is proved to be the thief, he can be dealt with in another and much more exemplary manner; and, in this connection, reference may be made to the report of a case which appears in our "Legal Intelligence" to-day. But without such proof, or something very nearly approaching it, there is no justification for regarding the consumer as dishonest; and we must emphatically disagree with our correspondent's contention that the money in a prepayment meter is of necessity a temptation to poor consumers. There are many dishonest persons, of course; but that they form anything like a large proportion, even among the poorest class, we do not for a moment believe. If, however, our correspondent thinks differently, he must fall back upon the agreement, and strictly enforce its provisions—though it cannot be said that even the signing of an agreement by a man who possibly cannot read, and even if he can may not be able to fully understand the necessary legal verbiage, is altogether without its disadvantages. The prepayment meter consumer has usually to pay a moderately stiff price for his gas; and may not this fairly be taken to include some additional element of risk in the shape of loss of money, beyond what has to be encountered with people receiving their supply through ordinary meters? The advertising in a working-class district of such an opinion of the consumers as our correspondent puts forward, would, we venture to think, do more harm to the Gas Company's interests than a dozen Longton judgments.

Our article was penned in the interests, not of the consumers, but of the suppliers of gas themselves; and, the opinion of "Lex" notwithstanding, we confidently assert that companies and corporations will be the gainers by treating their prepayment consumers, not as criminals, but as persons entitled to every consideration, not alone in justice, but by virtue of their constituting a very profitable branch of the business of the undertaking. The poorer the consumer, the greater is the reason why such losses should not be borne by him but by the wealthy supplier, to whom the amount involved is, comparatively speaking, trifling. We shall be glad to receive the views of some of our readers—and there must be many—who have not experienced "the "great difficulties" referred to by our correspondent "in the "way of dealing leniently with such cases in practice."

A Question of Purification.

ONE of the most interesting cases of modern times from the purely gas manufacturing point of view ended at the Greenwich Police Court last Friday. With the present hearing, it has occupied the Court on three separate occasions; and in it are involved several questions of importance and usefulness to the gas profession. Sydenham—in the lower part of which district the Crystal Palace Gas Company carry on their operations—is one of the popular, salubrious residential suburbs of London, and the inhabitants enjoy a good average health record. But a couple of years or so ago, the sensitive olfactory nerves of a few people living in the neighbourhood, at varying distances from the gas-works, became offended in a greater degree than aforetime; and they at once took advantage of the time-honoured custom to lay the responsibility for the disagreeable odours upon the gas-works, with the result that the Lewisham Borough Council were moved, and the Gas Company were hauled before Mr. D'Eyncourt at the Greenwich Police Court. The proceedings were taken under section 21 of the Public Health Act of 1891—the charge being that the Company carried on a "trade, "business, process, or manufacture, causing effluvia" which "was certified . . . to be a nuisance." If a nuisance is proved, the section, unless it is shown "that the best "practicable means for abating the nuisance" have been used, subjects the offenders to a penalty.

The Company were fortunate in having the case, which involved many technical points, tried before a Magistrate possessed of such clear perceptive power as Mr. D'Eyncourt; for he early declared his recognition of the fact that such a process as gas manufacture cannot be conducted with an absolute freedom from smell. At two of the three hearings, his Worship was treated to one of the most peculiar tales as to the evil effects which arose from the alleged evil exhalations of the gas-works that has ever been heard. The smells had had a nauseating effect upon the witnesses called; and yet the prosecutors declined to go so far as to say that the smells were "injurious or dangerous to health." Medical men were called, who testified to the disagreeable odours, and referred learnedly to the subtlety of gas-works odours in undermining health; but not one of them could produce

an instance of a patient who had actually suffered in any way from this cause. One witness's plum and other trees had actually succumbed to the debilitating influence of the emissions of the gas-works; but, speaking generally, the vegetation and foliage of the trees of Sydenham at the time were as luxuriant as ever. In addition to this, witnesses spoke to there being an oleaginous deposit on footpaths and in other places when it was damp; and this, of course, also emanated from the wicked gas-works, though no one was prepared to say that it was by any means general in the portion of the district over which the wind would carry the effluvia at the time being. However, the evidence was sufficient to convince Mr. D'Eyncourt that there was a nuisance, though it was amply clear that he was satisfied some of the effects were more imaginary than real. It may be submitted, if the tales of the local witnesses are to be credited, that the gas-works odours of Sydenham have a striking individuality of their own in their strong attachment to particular persons, places, and things. At the same time, it cannot be denied that on the special dates to which the summonses referred, there was some reason for complaint; but, as last Thursday's evidence made clear, it was due to the special circumstance of a complete changing of the coal-gas purifiers, in order to convert their method of working to the rotation system. Prior to that date, the lime purifiers were worked in two series of six boxes each—three in each series as carbonates, and three as sulphides.

However, at the outset of the proceedings, the carburetted water-gas plant was strongly suspected of being the offender; the introduction of this plant almost synchronizing with the time that the aggrieved residents asserted that they had special ground for complaint. But at the second hearing (in July of last year), Mr. E. H. Stevenson was called on behalf of the prosecution; and he attacked the sufficiency of the purifying plant generally—both water gas and coal gas. A rather nice point is raised here on the question of purification authority. Mr. Stevenson based his calculations on the "generally accepted" formula; but it appears that the "generally accepted" formula is not accepted in the large gas-works of London. In fact, Sir George Livesey declared that purifiers have been constructed for the South Metropolitan Gas Company according to Newbigging's rule, and it has actually been found necessary to reduce them. It was also proved beyond dispute by Sir George and Mr. H. E. Jones that the Crystal Palace purifiers exceed in area, by some 25 per cent. (of course, in proportion to the gas made), the purifiers of either the South Metropolitan or the Commercial Gas Company, who have to work up to a more rigorous code in regard to purity. Mr. Stevenson's comment upon this is interesting; and perhaps, considering all things, a little bold. He said: "Assuming it is so"—that the area of the purifiers of the London Gas Companies is less in proportion than that of the Sydenham works—"then the "management of the London Companies is much worse." To say the least, this is a little ungracious and disrespectful from one whose practical experience in the responsible management of a gas-works will bear no comparison with that of men of the life-long working experience of Sir George Livesey and Mr. H. E. Jones. The rules born of practical experience are much to be preferred to any amount of text-book formulæ; and apparently so thought Mr. D'Eyncourt. In view of this and the evidence of the two experienced experts just named, it is unnecessary to remark further upon this point of area.

But to return to the course of the case. In July of last year, the Magistrate adjourned the proceedings *sine die*, under the power conferred by the statute, in order to see whether the Company could do anything to abate the nuisance complained of, which, such as it was and so far as it could be charged against the gas-works, appears now to have been due to the ordinary work of changing the coal-gas lime purifiers, save on the exceptional occasion previously referred to. The conversion of the method of working to the rotation system in the case of the coal-gas purifiers has effected a considerable reduction in the number of changes necessary; the spent lime is now removed from the works the day it is cleared from the purifiers; the percentage of carburetted water gas has been lowered to 12½ (a 40 per cent. reduction); the water-gas lime purifiers have been abolished; and the oxide in the others is now partly revivified *in situ* by the admission of a small quantity of air. These changes have, it is admitted by Sir George Livesey and Mr. Shoubridge, effected an improvement; and, while the local evidence on Friday was a little contradictory on the point, three witnesses called by the prosecution unreservedly stated that there had been nothing to complain of for several months past. In this fact there seems clear proof that it was not the carburetted water-gas plant that was at fault; for it was only until September of this year that the discontinuance of the lime purifiers in connection with the plant was effected. Mr. D'Eyncourt was convinced by the evidence that the Company had adopted "the best practicable "means" of abating the nuisance; and therefore he refused to convict. But as the Council by their action had been instrumental in producing the improvement, he suggested that the Company should contribute towards their costs. This they did in a manner which his Worship described as very generous. Altogether, the result is a most satisfactory one so far as the Company are concerned, and a victory for practical experience. After this it need not be said that the report of the proceedings will be found worthy of the closest attention on the part of our engineering readers.

Conclusion of "The Times" Articles on Municipal Socialism.

THE conclusion of the series of "The Times" articles on Municipal Socialism will be regarded differently in the various local circles which have found themselves haled into an unexpected publicity, according as the leaders of local opinion look at the manner in which their concerns have passed through the ordeal. Some must be glad to have escaped it. Whatever may be thought of the intrinsic or the relative importance of much that has been brought out in the course of these articles, as constituting points of actual local government practice, the value of the work done, as a fairly consistent whole, is indisputable. For the first time an attempt has been made, and worked through to a definite conclusion, to publicly review the facts of British local government as exhibited in many conspicuous examples, from an independent and unofficial standpoint. The circumstance of the investigation having been co-ordinated with a particular line of criticism indicated in the title of the articles, is one of its chief recommendations for the practical publicist. Without some such guide, an inquiry of the kind would be liable to go astray, and would probably in the end be lost in the morass of party politics. In this case, the danger has been very cleverly avoided. One of the chief elements of value in the articles is the fact of their having appeared in "The Times," and so placing the matter above the hole-and-corner fashion in which it is usually dealt with. Thus the barefaced way in which certain Trade Unions and Socialistic organizations have been accustomed to manipulate the machinery of local government to their own ends, calculating on the obscurity of their environment, has for the first time been displayed in the full light of day. Politicians and statesmen who do not breathe the atmosphere of such regions as West Ham or Poplar, although they are responsible for the legislation which helps to make these places what they are, have been brought to the knowledge of what local government in such districts really is. Theory and practice in local affairs have thus been exhibited together, for the first time in domestic political history.

The reason for the initiation of the inquiry may be shortly stated, as having been the vague but positive uneasiness felt by almost every reasonable being cognizant of the facts, in face of the large and increasing amount of local indebtedness, and the rising of the rates, notwithstanding the almost universal increase in rateable value. It concludes with the finding that the unrestricted growth of a huge local debt constitutes a source of possible danger to the finances of the country. The uneasiness caused by this indebtedness and its rapid growth is not dispelled, as the Progressive Party in municipal politics do vainly pretend, by the consideration that a proportion thereof has been incurred for "remunerative undertakings," which this inquiry has ascertained to be only too often of a highly speculative character, while municipal book-keeping in general is too unreliable to remove doubt as to their value as assets. Partly on account of the fashion of these speculations, and partly by reason of increased municipal expenditure right along the line, the rates are advancing so as to constitute now a considerable burden upon the community. This burden is for the time being most felt by manufacturers, industrial companies (we

know what Sir W. T. Makins, Bart., has recently had to say on this head), and property owners; but it must ultimately fall upon the poor in the shape of higher rents, lower wages, and increased cost of commodities. The remedy for the ascertained evils is to be sought for, not in fresh sources of taxation or adventure into further speculative enterprises in the pursuit of problematical profits, but in bringing about a sounder and more effective control over local expenditure generally.

The "principle" being the fashion, it follows that new municipal enterprises are embarked upon too readily, without sufficient prevision of the future. Whether through intentional recognition of Socialistic principles or not, it is the fact that the municipalization of public services has already gone far in the Socialist direction. Concurrently with this, the practices of direct employment and municipal housing have attained considerable vogue, which means the extension of Trade Union influence and control, not only over local authorities themselves, but also over all business firms having dealings with them. There is a risk of losing sight of the primary duty of a local governing body—which is to govern, and not to trade—through the eagerness of some local authorities to acquire possession of various concerns which would pay more in rates if left alone than they ever could in the form of problematical profits of municipalization. While the direct consequences of the unrestricted expansion of municipal trading enterprise are sufficiently formidable, the indirect influences and results, while more insidious, are even more redoubtable. The tendency is to paralyze private adventure, and as a consequence to drive out of employment unofficial talent.

As to the remedies, the writer of "The Times" articles, being a professed Individualist, hankers after voluntary action in the shape of a Municipal Reform Association, supplemented by Government action of some sort, more especially in the matters of book-keeping and audit. We fear that the suggestion of an Association of the character indicated is hopeless, owing to the diffused nature of the interests to be organized and the elusiveness of the evil to be combated. There is more hope in individual effort; for one voice to which the people will hearken is as good as the shouting of a stock company. If only the facts are kept in evidence, the statesmen dare not neglect them. There should clearly be a stricter Government control over the raising of local loans and the expenditure of local resources. As this matter stands, one spell of an "enterprising" local authority may saddle the district with liabilities which will last a generation; and the ratepayers have no real protection against such extravagance. As regards the principles of municipal finance, it is suggested that "some definite law, rule, or "regulation should be laid down on (*a*) the making of due "allowance for depreciation prior to any claim of net "profit; (*b*) the transfer to other accounts of items of "expenditure incurred in the special interests of some "particular undertaking; (*c*) the utilization of profits on "one undertaking to make up the losses on another; "(*d*) the application of profits to purposes for which the "local authority has no power to levy rates; and (*e*) the "question as to whether profits should go to the reduction "of the rates or to the cheapening and improvement of the "service."

Remembering the long years that the "JOURNAL," almost alone, has advocated these principles of the administration of local authorities' undertakings, it is with a shade of gratification that we perceive at length that their enforcement is propounded as the need of the day. We have not overlooked the fact that an answer, of a kind, to some of the strictures in the articles has been volunteered by certain provincial Lord Mayors; but the point they make—that municipal trading enterprise is always excusable when it is connected with the preservation of sole municipal control of the streets—is too important to discuss at the end of a general article. We must reserve it for more respectful treatment on a future occasion.

A Case of Alleged Gas Poisoning.

AN alleged case of personal injury due to gas poisoning occupied the time of Mr. Justice Lawrance and a Special Jury, in the King's Bench Division, during three days of last week, and will probably last for some time longer, as the Company's defence was only opened when the Court adjourned on Friday. The plaintiffs are a married couple named Waters, residing at Brighton; and they plead that, owing to the negligence of the Gas Company's servants in connecting up the existing disused internal piping of their house with the Company's main without seeing to the security of all the points, there occurred, on the night of Dec. 23 last, a serious escape of gas into their bedroom, with the result that Mr. Waters suffered great and permanent injury to his health, while Mrs. Waters, although poisoned, suffered in a lesser degree. Mr. Waters claimed to recover £1500 damages, and Mrs. Waters £50, from the Company. The case, though a heavy one from the amount of the claim, does not raise any novel point of law or of gas-supply practice. The issue is therefore purely a question of facts as to the circumstances in which the escape of gas arose, and the character and extent of the injuries suffered by the plaintiffs. The only matter of general interest in the case relates to the liability of gas companies laying on gas to existing fittings to make absolutely sure that these are left in a proper condition. The question here is that of the existence of a dangerous point where a certain pipe end, provided for a gas-bracket but not used, was stated by the principal plaintiff to have been loosely plugged with a piece of wood. When the Gas Company's men had finished making the new gas connection, it is asserted that they forgot to securely plug this particular point. The same night, the cause of complaint arose. The job was not completed until six o'clock in the evening, and the leak went on during the night. The complainant was very sick and felt very ill; but next morning he went to the Gas Company's office by nine o'clock and lodged his complaint. Finding his illness continuing, though he did not at first think it very serious, Mr. Waters commenced an action in the County Court for £50 damages. Then he saw doctors, and stopped the County Court action to commence the present suit in the High Court, claiming much larger damages. He alleged that since the gas poisoning he had been prevented from following his business, and was told that he must winter abroad for the next two or three years. Here the question of the effects of inhaling illuminating gas containing a proportion of carburetted water gas was raised as a means of accounting for the remarkable symptoms exhibited by the sufferer. The line of defence adopted by the Company, as disclosed in the opening speech of their Counsel, Mr. Bray, K.C., is that the plaintiff's case is grossly exaggerated; that he has not suffered in a pecuniary sense from the accident, such as it was; and that his condition of health is attributable to pathological causes wholly distinct from, and inconsistent with, the theory of gas poisoning set up.

Etymology of the Word "Gas."

A WRITER in the current "Quarterly Review" makes an interesting incidental reference to the historical origin of the word "gas," which was recounted in the "JOURNAL" for October 8, 1901, on the authority of Sir M. Foster, the eminent physiologist. He stated, in a book of contemporaneous date, that the word was a claimed invention of Van Helmont, who flourished from 1577 to 1644, and wrote voluminously and indifferently upon chemical and what we should now call spiritualistic subjects. The invention was an exceptionally happy one of its kind, which is more than can be said of all Van Helmont's suggestions. He chose the word deliberately for its assonance with the classical word "chaos," meaning the primeval condition of the cosmos which is otherwise described as being "without "form and void." It was, as we have said, a lucky hit; and the word has received the distinction of adoption into all the languages of the civilized world. The writer in the "Quarterly Review," however, makes a slight blunder in describing the origin of the familiar word as a study in etymology. "Who, for instance," he inquires, "without the "help of the etymologist, could have suspected that a term "so essentially modern as our 'gas' was suggested by the "primeval 'chaos' of the old Greek cosmography?" Who, indeed? But we venture to suggest that anyone who should rely upon etymology alone for guidance to the source of the word, would be misled. A very respectable authority of this kind to whom we habitually resort for assistance, attributes the invention of the word "gas" to Van Helmont, but thinks he got it from the analogous word in his native Flemish "geest"—"geist" in German. So much for the etymological view. In truth, there is no etymology in the case, if the science so named is understood to be limited to the ascertainment of the derivation of words, as some

hold it to be. For a real and true invention cannot be derived. One would reasonably conceive that at the precise psychological moment when he was trying to think of a word for that curious, springy, invisible form of matter which he knew as a product of fermentation and also knew was not air, Van Helmont might have thought about "geest" for its name. A modern materialist would almost certainly have done so; but Van Helmont was a spiritualist as well as a physicist. Consequently, the very last thing he could have done without outraging his own principles would be to call anything "spirit" which he knew quite well to be really matter. That it was not tangible, visible matter was nothing to the purpose. Matter it was still; and accordingly the truly great Fleming gave it a brand-new name which recalled to him the perhaps similar primitive form of all the material Universe. It was a grand conception; and it has endured to this day, because it was well founded. In the beginning, still the material philosopher avers, the Universe was in the form of a gas. The old Greeks called it Chaos. We know the melodious English phrase into which the word of Moses on the same subject was translated. They are very much alike.

The American Gas Association Technical School.

THERE was one portion of the excellent presidential address of Mr. W. R. Beal to the members of the American Gaslight Association which we had no space left to mention last week. It was the reference to the technical educational work of the Association, which comes down in our abstract to a few lines. The interest of the matter, however, must not be gauged merely by the bulk that it makes in such records, which must take more account of the things of the passing hour, whereas this work is of a permanent character. It is one of the peculiar glories of the American Association that, albeit dominated by a system of trusts alternating with cut-throat competition, such as might be reasonably expected to take the heart out of the profession, it nevertheless contrives to obtain moneyed support for, and to run with general approval, a scheme of technical instruction by correspondence such as no other Gas Association in the world has attempted to carry on. The phenomenon is truly remarkable. If one were to pay heed to certain English newspapers and politicians, the American system of trading by means of "trusts" or "combines" should be one of the most soul-destroying of inventions which Mammon was ever called upon to sanction. It is the turnip-headed bogey of our days—or, rather, of our nights, because it is chiefly worked by the evening newspapers. Yet, as a matter of fact, the first great "combine" in the American gas business was the United Gas Improvement Company, of Philadelphia; and the systematic instruction and the adequate remuneration of followers of the gas industry were among the first cares of this organization. It is the American "trust" companies that chiefly support the instructional scheme of the American Gaslight Association, which is carried on at considerable expense—for Brother Jonathan is no believer in doing things by halves—and is of a proved utility that has been vouched for by one of the foremost of American gas magnates. It is a striking lesson, howsoever regarded.

Failure of Municipal Telephony at Tunbridge Wells.

THE controversy on the subject of municipal trading will receive fresh impetus from the fact of the Tunbridge Wells Town Council having decided to hand over to the National Telephone Company the entire system of municipal telephones started in the district eighteen months ago. This experiment has been greatly relied upon by the Progressive party in municipal affairs everywhere, as showing what can be done in the way of telephony by a really enterprising local authority. The subject of telephony itself, irrespective of the question of ownership, has been discussed in these columns on previous occasions, chiefly in respect to the points in which it resembles or differs from gas supply. The most important difference lies in the circumstance that an exchange telephone service, unlike a public gas supply, increases in cost the more it is patronized. The chief similarity of the two services, apparently, consists in the fact that competition in the same area is wasteful, and indefeasible on other grounds. The experience of the Tunbridge Wells Corporation with their telephone system also resembles that commonly resulting from municipal adventure into the field of electric lighting—the actual capital cost has largely exceeded the original estimate, while the expected profits have failed to materialize in hard cash. The Corporation began with an estimated outlay of £11,000, which had to be supplemented with more money. An additional loan was therefore taken up, in the expectation that for £25,000 the Corporation would get 1150 completed lines. But it has turned out that only 853 lines were provided, and the prospect of a profit has therefore vanished. An inquiry was recently instituted, the outcome of which is that the undertaking will probably be handed over to the National Telephone Company on terms which provide for the repayment of the loan of £25,000 by instalments. The Corporation will further engage not to enter into competition with the Company again. The matter has been discussed at two Town Council meetings, when the balance of opinion was greatly in favour of disposing of the undertaking as suggested, and so relieving the town of financial responsibility in this regard. The lesson is a valuable one—not least for the courage exhibited by the Town Council in facing and dealing with the facts of a disappointing situation. A little more of the same boldness under similar conditions would redound as much to the credit of English municipal corporations as a good deal of "enterprise" bolstered up by wilful blindness to actualities, which is far more common. Naturally, the disappointment of certain prejudiced observers of the experiment is keen, and a torrent of abuse is being poured upon the Town Council from quarters which do not appear to have any feeling for the ratepayers. As, however, the centre of a ratepayer's sensations is his pocket, and the action of his representatives in local government is for the protection of this sensitive part, the vituperation of outsiders will not hurt the Tunbridge Wells ratepayer.

A Surprise at Manchester.

Things electrical at Manchester are getting into a greater tangle than ever; and the ratepayers must be becoming perfectly bewildered. The complaints regarding delay, the outcry which has recently been raised with regard to the giving out of contracts, and, last but not least, the powerful attacks of Alderman Gibson on the enormous capital account of the undertaking, have combined to create a very uncomfortable feeling. And now comes another painful surprise in the shape of the resignation by Dr. Bishop of his position as a member of the City Council. Dr. Bishop has been Chairman of the Electricity Committee for the past two years; and at the recent elections he retained his seat in the Council after a vigorous fight, which was by no means free from personalities. Since his return, however, certain matters have been made the subject of inquiry by his colleagues, who last week held an informal meeting at which they drew up a document which was afterwards lodged with the Town Clerk. This document was to the effect that the Committee entirely acquitted Dr. Bishop of any intention to deal improperly with the Corporation in respect of certain expenses which had been charged for a visit to London last August, and sincerely regretted that the state of his health necessitated his retirement into private life. The explanation published in the local Press of this extraordinary development is that Dr. Bishop was responsible for the presentation of a bill of expenses, amounting to £33 odd, for the visit of a deputation of his Committee to London. In the expenses for five days that were charged, were included those of Dr. Bishop himself, the Vice-Chairman (Mr. W. H. Hesketh), and the Engineer (Mr. Metzger). On the arrival of the deputation in London, it was found that Mr. Metzger, whom they were to meet, had, consequent on the miscarriage of a telegram, started back to Manchester. In his absence, nothing could be done in the way of business; so the Chairman and Vice-Chairman spent their week-end in witnessing the Naval Review and taking a journey up the Thames. It had been agreed that each should pay his own expenses during the "off" days; and subsequently Mr. Hesketh sent Dr. Bishop a cheque for what he considered to be his share. The bill referred to, however, was afterwards put in, signed by the Chairman. Dr. Bishop, in an interview, states that the account was made out by a clerk from information he had obtained; and that he (Dr. Bishop) signed it without knowing to what it referred. "It is," he said, "a ghastly falsehood to say that I sent that bill for £30 odd in to the Corporation. The statement was put before me, as hundreds of other statements had been before, to sign;

and I signed." He added that he had insisted on tendering his resignation, after fully explaining all the circumstances to the Committee at their informal meeting. The resignation will be submitted to a special meeting of the Council to-morrow, when possibly more light will be thrown on this unfortunate affair.

The Value of a Good Character.

There are few people or companies whose position is so secure that they can afford to be absolutely indifferent to the opinion of others concerning their actions; and among these favoured few gas undertakings certainly cannot be placed. This is even more clearly the case now than it was years ago, when oil was the only alternative for persons who did not care to use gas. "How to make gas popular" is a very good problem for managers to set themselves; but a careful study of the question of "How to make the gas company popular" is at least as important. At first sight, these queries may appear to be the same; but a little reflection will show that they are not altogether so, though a consideration of both is necessary to satisfactorily answer either. That is to say, in order to make themselves popular, it is requisite for a gas company to do more than merely demonstrate the superiority of their commodity as an illuminant and heating agent though this is the chief object to be aimed at in finding a solution to the first problem. Gas undertakings have a good article to sell; but their success in doing so must to a great extent depend on their business methods. Who at times, in his dealings with railway companies, has not wished that there was some other satisfactory means of transporting himself or his goods from place to place, so that he might be quit of them and their ways? It behoves gas suppliers to beware lest they engender a similar feeling. We are glad to be able to say that, generally speaking, those responsible for the management of gas undertakings are fully alive to the necessity for avoiding what would, in their case at least, be a grievous error—seeing that they hold no monopoly of artificial lighting, but only of the supply of gas. Their efforts, however, often do not meet with the recognition they deserve; and in the front rank of those who show unwillingness to accord the credit so well merited, must be placed a large section of the public Press. This, of course, renders our pleasure the greater when we do come across a flattering reference in the columns of a newspaper to the policy of the local gas company.

And a Company who Have Earned It.

Such an instance occurred last week, when the Eastbourne Gas Company were the subject of a laudatory paragraph in the leading paper of the town. This praise must be all the more gratifying to the Directors and officials of the Company, in view of the criticism to which they have recently been subjected by one or two of their shareholders, and also of the fact that hitherto the paper in question has strongly pinned its faith to electricity, often to the disparagement of the older illuminant. That the praise is thoroughly well deserved will be admitted by all—with the possible exception of the one or two shareholders already referred to—who are acquainted with the affairs of the Company. Within the past four years, the output of gas has increased by over 37 per cent., and now exceeds 320 million cubic feet per annum; and to enable pace to be kept with this growth of business, a further issue of capital is being made. The Company have recently acquired new central offices and show-rooms, of which full use is made for telling how to use gas as an illuminant, and what are the most up-to-date appliances for utilizing it as a heating and cooking agent; while they also announce their readiness to undertake the maintenance of incandescent lights. The vigorous policy of the Company is meeting with its reward, as, indeed, could hardly fail to be the case; and while the business continues to be conducted in the present able manner, the shareholders need have little fear for the safety of their very handsome dividends The Company's achievement is the more noteworthy inasmuch as the Corporation are running an electric lighting undertaking in which a sum of nearly £200,000 has been sunk; and in this connection, there is a very significant wish expressed in the newspaper before us. The writer says: "I sincerely hope that the Electric Lighting Committee of the Town Council will recognize the wisdom of treating the Gas Company in a fair and friendly spirit. For instance, it would be unwise and wrong on their part to remove incandescent lamps where they answer exceedingly well and cannot be improved upon in respect of cheapness." This is adopting the part of "candid friend" with a vengeance; but the remarks are sound common-sense, and the Electric Lighting Committee will do well to bear them in mind. Altogether, the "Eastbourne Gazette" has given the Company a splendid testimonial. The Company have fully earned it; and they will find it of great benefit to them.

A Curious Accident.

We report to-day an inquest on a stoker at the Dartford Gas-Works, who met with his death in a remarkable manner in a stoke-hole, as the result of carbonic acid poisoning. There does not appear to be any record of a similar accident having occurred in any part of the country; and the Inspector of Factories who attended the inquiry stated that there was absolutely no danger from carbonic acid in the quantity said to have been present in the air—8 parts to 10,000. The only way in which he could imagine that even this amount of the gas could have got into the subway, was by means of a down-draught, which would be only momentary. He said he had made inquiries, but could not find that any precautions were taken elsewhere, because no danger was ever feared. However, the man was found dead, and the doctor who made the *post mortem* examination stated that death was due to poisoning by carbonic acid gas; so that the danger is evidently one to be taken into account. With a view to preventing a similar accident happening in future, the Inspector suggested that when a man went down into a stoke-hole he should be accompanied by another workman, and also that a supply of oxygen for application in case of need should be kept on the premises. The Manager of the Dartford Gas-Works has undertaken to carry out these recommendations, and doubtless others will follow his example, though, of course, at many works the desirability of always keeping a supply of oxygen at hand for emergencies has long since been recognized.

End of the Devonport Gas Company.

A statement of accounts has been issued in connection with the liquidation of the Devonport Gas Company, whose undertaking, as our readers know, has been acquired by the Corporation. The amount of the award was £149,570; and interest brought this up to £151,538. The Company's assets, including gas-rents collected up to Dec. 31, 1901, amounted to £11,441, less dividend to that date £2426. This left a balance of £142,523, which was the net sum received from the Corporation. The total amount to the credit of the Company was £154,534. Out of this there has been paid a first distribution to the shareholders of £11 on each of the 7000 original shares, and £6 12s. per share on the 3000 guaranteed shares; making a total of £96,800. In addition, there has been paid in dividends £2481; consumers' deposits, with interest, £1862; interest on debentures, £246; liquidation expenses, £494; arbitration expenses (less £2000 received from the Devonport Corporation), £2967; liabilities discharged by the Company to Dec. 31, 1901, £4899; overdraft at the bank, £32,357; and bank charges, £496. These items, with some smaller ones, amount to £43,822, and together with the sum already distributed make a total of £140,622; leaving a balance of £13,912 to be still distributed among the shareholders. The Company's costs at Quarter Sessions and in Parliament, which amounted to £5105, were met out of the reserve fund.

WATER AFFAIRS.

Limit of Time for Recovering Water-Rates.

THE decision of a King's Bench Divisional Court, consisting of the Lord Chief Justice and Justices Wills and Channell, in the case of *Elliott and Another v. Russell*, reported in the "JOURNAL" last week, may be commended to the attention of all purveyors of water; the question before the Court being the limit of time within which proceedings must be taken to recover rates. The Corporation of Southampton had furnished to certain consumers a supply of water for trade purposes at 8d. per 1000 gallons; and in respect thereof a sum of £3 3s. 9d. was due to them for the period

between the 21st of March and the 5th of June last year. It appears that no demand was made for payment until the 18th of August; and then the debt was not discharged. The matter remained in abeyance till the 13th of February last, when the collector (the respondent in the present proceedings) lodged an information against the parties to recover the money. They disputed their liability on the ground that, the debt having been incurred in the previous June, the six months within which an action should have been brought had lapsed. The matter came before the local Justices, who decided in favour of the claimant, and ordered the amount to be paid; but they stated a case for the opinion of the High Court.

It was submitted, on behalf of the appellants, that if the six months' limit dated from the day of the demand, proceedings to recover water-rates might be delayed indefinitely; but it was contended that, under the Public Health Act, 1875, no demand was necessary. The power to charge for water was conferred by sections 56 and 57, the former of which provides specifically for the recovery of the rate; and therefore the provision in section 256 that there should be a demand in writing before the institution of proceedings did not apply. Two cases were cited in support of the views put forward on behalf of the appellants—viz., *East London Water-Works Company v. Kyffin* and *East London Water-Works Company v. Charles*. But it seems to us that neither was quite on all-fours with the case before the Court. Mr. Kyffin's case, it may be remembered, arose out of the short supply of water from which the East-end suffered during the exceptionally dry weather of 1895. He sought to recover penalties for personal injuries sustained owing to failure on the part of the Company to maintain a constant service of water to his premises; and he was ruled out of Court, by Lords Justices Lindley and Kay, because he had not complied with the provision in section 43 of the Water-Works Clauses Act, 1847, and paid in advance the rates for the water for the period of the alleged insufficiency. In the other case cited, the action was to recover £6 12s. for water-rates chargeable in respect of some houses at Cubitt Town; and the Magistrate dismissed the claim on the ground that the rates had become due and been demanded more than six months before the date of the summons. The chief point the High Court had to consider there was not the limit of time for taking action under section 11 of Jervis's Act (11 & 12 Vic., cap. 43), because the Company admitted that the six months had elapsed when the summons was issued, but the applicability of that section to proceedings in respect of the recovery of water-rates. Justices Wills and Kennedy, before whom the matter came, decided that the Magistrate was right; and they dismissed the appeal.

Coming back to the case under consideration, it was submitted that the six months began to run when the complaint arose—the complaint being the refusal to pay; and that until the demand was made no refusal was possible. The Lord Chief Justice upheld this contention. Dealing with the suggestion put forward on behalf of the appellants, that the provisions of sections 56 and 57 of the Public Health Act, 1875, precluded the application of the subsequent section, requiring a demand in writing before the institution of proceedings, he pointed out that section 57 incorporated certain provisions of the Water-Works Clauses Acts, the effect of which was to make the rate charged by the Local Authority a rate under those Acts, and consequently recoverable in a Court of Summary Jurisdiction. This being so, all his Lordship had to do was to apply section 11 of Jervis's Act; and, in so doing, he decided that the date of the demand was the one which governed the limit of time. The Magistrates were therefore right in their conclusion, and the appeal from them must be dismissed. With regard to the cases cited, his Lordship said there was nothing in that of Mr. Kyffin to conflict with the present one; and he thought it was not the intention of the learned Judges who tried it to lay down the proposition that no demand, in any circumstances, was necessary. Justices Wills and Channell concurred; the former emphasizing the point, in reference to the case of Mr. Charles (which, as already stated, came before him), that the decision therein had nothing to do with the six months' limitation.

Looking at the circumstances of the case as they were presented to the Court, it would appear at first glance that the appellants were right in their contention that the cause of the information arose when the money was due—that is o say, some time in June, 1901. But what amount was due? It must be borne in mind that the water was supplied by meter, under agreement; and, as the Lord Chief Justice suggested, it may be questioned whether the extent of their indebtedness was known to the appellants until the demand was made. This, however, was left out of consideration. We cannot help thinking it was a little lax on the part of the collector to allow so long an interval—from June 5 to August 18—to elapse before sending in the account. But, on the other hand, the question may be asked, Why did the appellants, when, after being allowed more than two months' grace, payment was asked for water of which they had had the use for carrying on their business, consider it to be consistent with fair dealing to put the purveyors of that water to the trouble and expense of proceeding against them for the amount due? Surely not because they had not at command such a trifle (to business men) as three guineas. Why, then, was this matter allowed to go into Court? If the sole reason was to obtain a definite and unequivocal pronouncement upon a somewhat difficult legal question, they will have received good value for their outlay by getting one which was unanimous. The fact that it was dead against them will probably be regarded as of minor importance compared with the benefit which they will have conferred upon water suppliers and consumers by evoking these judgments, which will doubtless be preserved, for reference in the future, in the valuable series of volumes in which the proceedings of the Courts are concisely recorded.

Water Supply in West Middlesex.

Few people who during the past seven or eight years have had to make the journey from the Marble Arch to Hendon can have failed to notice the remarkable rapidity with which the district of Cricklewood has been covered with houses. The district, it is scarcely necessary to say, lies in the area of the West Middlesex Water Company; and the effect of its growth on the Company's business has latterly been a very gratifying feature of the addresses of the Chairman (Mr. Edmund Boulnois, M.P.) at the half-yearly meetings. It was not conspicuous by its absence last Tuesday, as will be evidenced by the report which appears elsewhere. In the six months ending the 30th of September, 683 new supplies were put on; bringing up the total to 89,105. Finality has not been reached, for houses are constantly being added, especially to the north. These are not the dwellings of the wealthy, but they are none the less well looked after by the officials. In the early days of the development of this district, the supply, if we remember rightly, was only intermittent. Now it is unlimited; and the cost to the individual is about a penny per week. It must be borne in mind, when considering this charge, that these new houses are fitted with baths; so that the occupants enjoy, as a matter of daily experience, a privilege which not very many years ago was regarded as one specially reserved for the wealthy. The effect of this immeasurable boon upon the health of the community does not need emphasizing. All this building means, as already remarked, more business for the Company; and therefore we are not surprised to find that the profit made in the six months covered by the report was £4000 more than in the corresponding period of last year. The proprietors take their full dividend at the rate of 10 per cent. per annum; and the consumers would share in the prosperity of the concern by receiving the rebate to which they have been accustomed, were it not that the fund of the Chamberlain of London makes an annually increasing demand on the Company's resources. Mr. Boulnois referred with satisfaction to the approaching completion of the intercommunication scheme, which will remove to a very remote distance the possibility of any part of London being short of water at any period of the year. Of course, he had something to say about the pending Water Bill, which, it seems, is to come up for reconsideration in Committee of the House of Commons some time during the week commencing on Monday, the 1st prox. Notwithstanding the assurances of the Government, he would be a bold man who would predict that it will pass, and a much bolder one that the consumers and ratepayers will be one whit the better off if it should do so. Mr. Boulnois thinks that they will not; and there are many who share the opinion.

Peat gas has been employed as fuel at the Motala Steel-Works, Sweden, for the past thirty years; and though it is dearer than coal gas, it is preferably used because of the insignificant amount of sulphur and phosphorus it contains.

ESSAYS AND REVIEWS.

STREET-LAMPS UNDER TEST.

It is always a matter of considerable pleasure to us to receive information bearing upon any of the divers questions affecting the industry in which "JOURNAL" readers are mainly concerned; and therefore we have to express our indebtedness to Mr. J. W. Bradley, the City Engineer of Westminster, for forwarding to us the results of photometric tests of street-lamps in Westminster as carried out by the testing branch of his department during the months of April, May, August, and September this year. The lamps that underwent examination comprehend quite a variety, which, as they are all existent in Westminster, to say the least evinces a broadness and openness of mind in the matter of public lighting on the part of the City Authority and their Engineer; while, at the same time, it shows that uniformity in the lighting of the streets and public places of Westminster is a long way from attainment. The former is a merit that cannot be adversely criticized, as, while it continues, it gives an assurance that the Westminster Councillors are not going to commit their streets entirely to any one particular system without fair trial and experience. As to the want of uniformity in lighting the streets, that could be unkindly criticized by the partisans of any one system, and by the supporters of gas lighting from several standpoints. But this is a matter that does not fall within the range of a notice of the results of the photometrical tests that Mr. Bradley has supplied.

But if we may make one comment upon the figures as a whole, it is that their value is largely depreciated by the fact that no information is given as to the form of photometer that was used (we assume it was the portable table photometer with the Harcourt standard pentane lamp), nor as to the atmospheric conditions under which the tests were carried out. The tests were made on different dates; and unless the state of the weather was absolutely identical on those days and the positions of the lamps comparable, the trustworthiness of the tests is open to question. Some point is given to this by the large amount of variability shown by lamps burning and situated in approximately similar positions and under like conditions. At the same time, while advancing this criticism, it does not in our view submerge entirely the interest of the comparisons that can be made between the figures obtained, seeing that the results are without doubt the nearest to exactness that could be secured by the means at disposal and under the circumstances. However, the lamps tested comprise electric arc lamps, Sugg's high-pressure incandescent gas-lamps, Welsbach and Scott-Snell self-intensifying lamps, ordinary incandescent gas-lamps, flat-flame lamps, electric incandescent lamps, and a portable Kitson oil-lamp. It is rather a pity that Mr. Bradley did not supplement the figures with the conclusions he himself draws from them; but as he has not done so, it remains for those into whose hands the document falls to make an examination on their own account.

Following the results, then, in the order in which they are tabulated, the electric arc lamps call for first notice. These lamps all consume 500 watts of electricity per hour; and the results are peculiarly instructive in their variability in lighting power as between lamp and lamp, date and date, and company and company. In the case of the lamps of the Charing Cross and Strand Electric Light Company, they are fixed at a height of 22 ft. 6 in. The results show that on April 21 five lamps in Whitehall gave returns of 400 candles up to 596 candles, with an average for the five of 463 candles. Tests of the same lamps seven days later produced candle powers ranging from 445 to 930 —the average being 561 candles. Why one lamp should have given such a high illuminating power as against from 445 candles to 490 candles in the case of the other four, is one of those mysteries in connection with electricity which require explanation. But then on Sept. 1 six other electric lamps in different positions gave readings varying between 800 candles and 1030 candles. Bearing in mind that the consumption is 500 watts, why should there have been this remarkable difference in illuminating power in comparison with the earlier dates? Coming to the St. James' and Pall Mall Company's lamps, the performances are not quite so erratic; but still they are sufficiently so to call for comment. The height of most of this Company's lamps is 2 feet less than in the case of the Charing Cross Company. On April 30, in the tests of ten lamps fixed in Piccadilly and St. James' Street, the illuminating values ranged between 517 and 878 candles, with an average of 674 candles. Those lamps were furnished with crystal globes; and three other lamps in St. James' Street, fitted with opal globes, gave, on the same day, results varying between 607 candles and 730 candles, or an average of 676 candles. This shows that the globes make no difference in the amount of light emitted. These three lamps, too, compare with the heights of those of the Charing Cross Company—viz., 22 ft. 6 in.; so that the height does not account for the difference in the illuminating value obtained for the 500 watts in April between this Company and the Charing Cross Company. On May 6, three lamps, with crystal globes, varied in their returns between 595 candles and 943 candles, or an average of 737 candles. The same day a result of 706 candles was obtained at the end of St. James' Place, with a lamp fitted with a special orange globe. On Sept. 3, six lamps on the footway in Pall Mall gave results rising from 530 candles to 648, with an average of 598 candles. Two days before, as we have seen, the six lamps of the Charing Cross Company that were tested were yielding an average of 937 candles. Similar wide discrepancies are found in the results of the arc lamps of the Westminster Electric Company, situated at a height of 22 ft. 6 in. One lamp out of six in Grosvenor Place, on May 1, gave only 582 candles, while another is credited with 972 candles—the average of the six being 675 candles. The same lamps on Sept. 3 ranged in illuminating value from 610 to 760 candles, with an average of 691 candles.

While the exceedingly great variations between electric lamps in the same thoroughfare and on the same day, and between the same lamps on different days, are inexplicable (assuming the consumption to be constant at 500 watts), we are not disposed to place much value on the minor inconsistencies, as disagreement of too large an extent to be ignored is equally prominent in the case of the gas-lamps, whether flat-flame or incandescent; and this rather confirms the view that the inconstancy of the conditions under which the tests were made and the method are open to serious question. Take six of Sugg's high-pressure incandescent gas-lamps in Parliament Street, situated at a height of 14 ft. 6 in., a variation is recorded between the highest and the lowest candle power of 187 candles—viz., 578 candles and 391 candles; the lamps being credited with an average of 459 candles. Four of the lamps on April 29 vary between 432 candles and 516 candles, with an average of 475 candles. On Sept. 1, the six lamps were again tested; and a difference is found between the highest and the lowest reading of 215 candles—namely 686 candles and 471 candles, with an average for the six of 552 candles. On April 28, we get an illuminating power with a cluster of four Welsbach self-intensifying lamps over the Châlet at Charing Cross of 2716 candles; and the next day two refuge (single) lamps of the same type returned 531 and 643 candles respectively. On Aug. 28, a Scott-Snell lamp at a height 3 feet less than the foregoing lamps, or 11 ft. 6 in., gave an illuminating power of 417 candles. No information is imparted as to the gas consumption of these high-power lamps.

When, however, we come to the ordinary lamps, containing single incandescent burners, we have definite figures on this point, but the same inconsistencies. Burning 4·2 cubic feet of gas per hour, the readings from six lamps on the footway of Victoria Street ran between 42 candles and 94 candles—the average being 61 candles, with lamps at a height of 11 ft. 6 in. On April 30, we have wonderful divergent results from five single-mantle lamps on the footway in Kensington Road—the lowest reading being 28 candles, and the highest 105 candles! The average of the five came out at 49 candles. Tested again on Sept. 2, the six lamps on the footway in Victoria Street were found to be rendering duty to the extent of an average of 62 candles—the lowest return being 33 candles, and the highest 85 candles. Half-a-dozen single-mantle lamps on Carlton House Terrace, on Sept. 15, did not, burning only 3¼ cubic feet per hour, give nearly such brilliant results—the lowest return being 27 candles, and the highest 46 candles, with an average of 37 candles. So that the saving of nearly 1 cubic foot of gas does not by any means compensate for the loss in illuminating power, in comparison with the burners using 4·2 cubic feet. If we could place reliance on these tests, it could then only be inferred that the incandescent burners in Westminster receive very inadequate attention.

Clusters of three ordinary flat-flame burners on the footway in Whitehall, burning 18·48 cubic feet of gas, only gave as good an account of themselves, both on April 28 and Sept. 2, as the Victoria Street single incandescent lamps, burning less than a quarter of the quantity of gas—viz., 4·2 cubic feet. Even in the case of these flat-flame lamps, there are considerable variations in the returns—in fact, as between 53 and 78 candles on April 28 and 47 and 78 candles on Sept. 2. We fail to understand why there should be such differences between flat-flame burners under identical conditions—burning the same quantity of gas, of the same illuminating power, and through burners of presumably the same type—excepting that the tests are vitiated by the circumstances under which they were carried out. The average on the first date was 62 candles and on the second date 61 candles. Clusters of threes in Chandos Street on Sept. 15, burning 15 feet per hour, tell the same tale—the lowest return being 43 candles and the highest 63 candles, with an average of 55 candles.

Among other tests were three electric incandescent glow lights, consuming 120 watts per hour each. In the first case, a lamp with two lights gave a total illuminating power of 52 candes; and in the second case a lamp with one light, 27 candles. A portable Kitson oil-lamp gave a light, at a height of 7 ft. 6 in. (with globe), of 456 candles—the pressure being 47 lbs. per square inch, and the reading taken at an angle of 45° with the line of the two mantles. Without the globe, but under similar conditions to the foregoing, the candle power was 500 candles; perpendicular to the line of the mantles (without globe), 504 candles; and in a line with the two mantles, 356 candles. The last three readings give an average of 453 candles.

But leaving these variable tests, which require something more than hypothetical explanation, we have a concluding table, showing the distance apart at which different lamps should be placed in order to illuminate the pavement midway between two consecutive lamps with an intensity equal to that of 1 candle placed 3 feet away, based on the foregoing results, which, a footnote here tells

us, "are not given as absolute standard values, but only as information resulting from the conditions which obtained at the time of testing." If notes as to these conditions had been printed alongside the figures, the latter would have been more valuable.

Description of Lamps.	No. of Tests.	Average Candle Power.	Average Height of Column.		Distance Apart.	No. of Lamps per Mile.
			Ft.	In.	Ft.	
1. Electric arc lamp.	50	670	22	0	107	49
2. Sugg's high-pressure. . . .	15	494	14	6	93	57
3. Flat-flames, 18·48 c. ft. per hour	9	61	12	3	31	170
4. Incandescent mantle, 4·2 c. ft. per hour	16	58	11	6	30	174

It will be observed from this table that the difference, in the number of lamps per mile, between the arc lamps and the high-pressure gas-lamps is small; but we undertake to say that there would be, in the matter of cost light for light, a respectable balance in favour of the latter lamps. Then, in regard to the flat-flame gas-burners in comparison with the ordinary incandescent gas-lamps, it will be remarked that the flat-flames are placed entirely out of the running by reason of their large consumption of gas.

Altogether, notwithstanding the striking discrepancies in the returns from similar lamps, the statistics given by Mr. Bradley are of use and interest—if only for the proof that we believe they afford of the unreliability of tests made under any but standard conditions of unimpeachable constancy.

ELECTRIC LIGHTING MEMORANDA.

A Disputed Electricity Bill in the City of London Court—The Law of Meter Registrations—Considerations of Justice and Prudence.

THE electrical journals appear to be somewhat exercised over a case decided by Judge Rentoul in the City of London Court, in which a customer of the City of London Electric Lighting Company was sued for the amount of a quarter's lighting bill, and raised the objection that the meter had registered incorrectly. Judgment was given against the Company; the Judge believing that the defendant's contention was justified. The facts were not very dissimilar from many with which gas companies have on divers occasions been familiar. The consumer had been on the Company's books for five years; and his bills for the corresponding quarters averaged a little over a pound. The disputed bill showed a jump to £3 1s. 10d., which he contended was unreasonable; and having paid £1 3s. 6d. into Court, which was, he submitted, ample, he decided to defend the action for the balance. The plaintiffs pleaded that, by their own Act, the record of the meter was to be held conclusive evidence of the consumption of electricity. This, if correct, is very different from gas law. It transpired that the meter had been changed three times, which does not go to sustain the reputation of this kind of instrument for infallibility. Besides, after citing their Act, the plaintiffs appear to have put themselves out of Court by admitting that the meters formerly used could not always be depended upon to register small quantities of electricity. The defendant, they urged, was rather economical in his use of light; and when only one or two lights were going, the meter sometimes failed to register. "The plaintiffs felt that they had a claim for previous undercharges, and that the change of meters had put the account right."

After this, of course, the Court could but decide the issue in one sense. To plead with one breath that the registration of the meter must be held conclusive evidence of the amount consumed, then to admit that the machine sometimes failed to register, and lastly to say something about a new meter recovering an old undercharge, was enough to damn the whole case—as it did. The Judge did not see how he could assist the plaintiffs. The claim could not be sustained on the evidence. Common-sense would be outraged if it were allowed. Judgment accordingly for the defendant, with costs. It is interesting to observe how this decision has been received in different quarters. A writer on legal matters in the "Pall Mall Gazette" declares that the judgment is sound law and good sense, observing that the pretence that the registration of a meter must be held to be conclusive evidence depends upon the fundamental consideration of its correctness. The "Electrician," on the other hand, styles the decision as "remarkable," and finds serious fault with it. We fear, however, that our esteemed contemporary is itself open to criticism in respect to its view of the law. It is observed that, according to the Electric Lighting Acts, the meter reading is to be held as *primâ facie* evidence of consumption. This is right. Then it is remarked that the consumer "has always the option of having the meter tested by an electric inspector in the case of a disputed account; and if he fails to avail himself of this, the meter reading must be assumed to be correct." This is wrong.

The confusion which appears to exist on this point of law in the mind of the electrical critic who ventures to condemn Judge Rentoul's decision, proceeds from a misunderstanding of the nature of what the law requires to be proved, in order to sustain a claim for payment for goods delivered. To cut it short, the claim must be a just one, and the common law of England is not to be trifled with on this point by any inconsistent statutory enactment. The fact of a supply of electricity, or of gas or water, being usually measured by a recording instrument, is merely a matter of convenience to both parties to the commercial transaction of purchase and delivery; it can be nothing more. It is absurd to suggest that a consumer of goods by meter forfeits his rights to just treatment by not himself taking advantage of the arrangements made by the Legislature for having meters tested. The supplying authority has an equal right to have this done; but in the present instance the plaintiff Company do not seem to have fortified their claim by previously attending to this rather obvious precaution. If they had done so, they would probably have recovered for the amount registered by the instrument. Instead of doing this, they talked about all sorts of qualifying considerations—opening the door to the admission of the same kind of observations from the opposite side. Gas companies have learnt by painful experience to leave nothing undone to support the quality of justice for their claim, when they take legal proceedings for payment for gas supplied by meter; and where this condition exists, failure to recover is not to be feared.

There have been failures, of course; but these can usually be explained. When one comes to think of it, the very ground upon which a recalcitrant consumer commonly refuses to pay, implies his perfect faith in the old registrations. He admits that it was right that he should have paid on the old indications, which were correct and just, while complaining of the latest one, if this compares with them to his disadvantage. This is not ground enough to sustain a refusal to pay, provided that the claim is shown to be just by reference to the ascertained accuracy of the meter. The consumer would be laughed out of Court if he pleaded against this that the old meter, which must have been unduly favourable to him, ought to prevail in perpetuity against an instrument certified to be correct. Naturally enough, the suppliers of the commodity, who are also usually the providers of the meters, are disposed to place faith in the accuracy of their arrangements; but we do not believe that the City of London Electric Lighting Company, or any other undertaking, have been specially favoured with a statutory enactment to the effect that these must be held to be infallible. It is for the suppliers to see that their consumers' meters are kept in good order; and when there is any reason to suspect that a consumer is not being charged for all he has consumed, the proper course is to make sure that the registration shall be indisputable for the future.

A NOTABLE EXPERIENCE AT HUDDERSFIELD.

ONE of the pleasing features of the half-yearly and annual statements from the directorial heads of gas undertakings, municipal and private, is the constant reference to "the progress of the gas industry"—meaning thereby the expansion that is continually going on in the consumption of gas. But we are sufficiently bold to hazard the assertion that there are few among those heads who could tell, with any degree of certainty, which branch of the business is the most productive in contributing to the progress. One man, without hesitation, would say the prepayment business; a second, the cooking and heating business; a third, the lighting business. Yet, in all three cases, as a rule the statement would be found to be more suppositional than authentical. In all gas undertakings it is, of course, an easy matter to tell what progress the prepayment system is making in relation to the ordinary consumption; but in all there are not existent means of subdividing the consumption under the two systems, and ascertaining the progress being made as between lighting on the one hand and cooking and heating on the other. And what is more, but few gas managers take steps to know this, so long as the total business done shows a respectable accretion year by year. At the same time, there is an importance in knowing everything that is to be known in this regard, in order that policy in the management may be so shaped that the best interests of the undertaking are developed to the fullest extent.

Regarding the lighting department of a gas undertaking, there is little to be said. The adjuvant power of the incandescent gas-light in combating the inroads of the electric light into this branch of the business has long been recognized by every gas manager, and, moreover, it has been for years accepted by them as the method that will give their customers the greatest return for the money spent in artificial illumination, and consequently the utmost contentment. We interpolate these remarks, in order that it may not be assumed from what follows that our view is that the cooking and heating department should receive increased attention even to the neglect of the lighting department. That is far from being our idea. The only intention is that some ascertained facts may receive due prominence, in order that the lessons they convey can be used to the advantage of their undertakings by managers who have not had the opportunity of adequately gauging the important way in which gas cooking and heating are influencing the progress of the industry.

Of course, there is always danger in applying generally conclusions and experiences drawn from a single case; but we know of nothing in connection with the Huddersfield Corporation gas undertaking that should make its experience in regard to the consumption of gas on the one hand for cooking and heating and

on the other for lighting different from that of many other undertakings—except, in some cases, in respect of the policy that is adopted in dealing with the former class of custom. In Huddersfield, there are differential prices for the two classes of consumption; and differential prices necessitate the use of special meters for the gas consumed for cooking and heating. This being so, it is easy to keep a record as to which branch of consumption is contributing the most to the development of the general business. It is the knowledge of this fact that stimulates interest in the statement that the Mayor (Alderman Ernest Woodhead, M.A.) laid before his colleagues yesterday week, and which statement has an important suggestive bearing—see p. 1353. The figures quoted were supplied to his Worship by Mr. E. A. Harman, the Gas Engineer and Manager.

The first group of figures bearing upon the point as to the relation in growth of the one class of consumption to the other is almost startling. The statistics show that the gas supplied for stoves and motive power during the last six years (the period during which gas-stoves have been largely adopted in Huddersfield) has increased—according to actual measurement, be it noted—by no less than 200 per cent.! But the whole figures give a better understanding of the significance of the statement. Six years ago—that is to say, in 1896—the consumption for cooking, heating, and motive power was 62,176,800 cubic feet; while in the year ending March last, it was 183,642,200 cubic feet, or an increase, in the sexennial period, of 121,465,400 cubic feet. Mr. Harman, we believe, attributes this large influx of business to the generous policy adopted by his Committee in letting out stoves on the hire and hire-purchase systems. Besides liberal terms as to rental, they fix the stoves without charge to the consumers, and also lay the necessary service-pipes free within the statutory limits. The easy method of obtaining cooking-stoves (without preliminary charges) has weighed with householders; and the effect is seen in the 200 per cent. increase.

But now we come to a further singular fact which this divisional measurement of the Huddersfield gas supply presents; and one feels a bit startled to find that, while there was this 200 per cent. increase in consumption in one branch of the business, there was, in the same six years, a decrease of 13 per cent. in the consumption in the lighting department. The actual consumption for lighting was 443,767,500 cubic feet in 1896 and 383,256,000 feet in the past year, or a decrease of 60,511,000 feet. We have said that it is a little startling to find this decrease; and the very bluntness with which the figures drive home the fact makes it so. But when the position is closely surveyed, the surprise is deflected to another direction, and it becomes a matter of congratulation that the loss has not been more. During the six years, the Council have adopted the incandescent gas system for the lighting of the streets throughout the borough, and the number of these burners in use for private lighting is legionary, and cannot possibly be estimated. Besides which there is the interesting fact that there are more electric lights in Huddersfield per head of the population than in any other town in Great Britain, excepting health resorts. *Ergo*—considering the great economy of the incandescent burner, its displacement of points of consumption, and the consumers who have gone over to electricity—there must have been a considerable increase in the number of gas-burners installed in the six years to have, on an output of so many millions, brought the loss into such narrow limits. But with business progressing so vigorously in the other department, a slight loss to maintain the bulk of the lighting business can be cheerfully borne, and we feel confident that the popularity of the incandescent burner will soon produce the compensation by bringing in new ordinary and prepayment consumers.

The value of the figures quoted lies in the lesson they teach of the important part that gas cooking and heating is playing in the development of our industry, and therefore the necessity devolving upon the managements of gas undertakings to deal with that department in a very benevolent spirit. Mr. Harman may be complimented upon his fruitful endeavours in extending the use of gas in this direction, and his Committee upon the generous policy they have adopted, and which has brought about the 200 per cent. increase in that channel of business in six years. Nothing more need be said. The facts may have their equals elsewhere; but in the absence of the separate metering of the consumption, they may not be so precisely known.

Carriage of Inflammable Oil by Railway.—With reference to the recent action by the Railway Companies in connection with this matter, of which notice was taken in our editorial columns on the 28th ult., we learn that an important meeting between the general managers of the largest companies and deputations from the Association of Tar Distillers and the principal oil companies was held on Tuesday last, and that an alteration in the consignment note for petrol and similar explosives was agreed to, by which the liability of the sender is limited to the consequences which might ensue from false declaration or failure to comply with the conditions of packing, &c., which are authorized by the Home Office. It is believed that the concession removes any ground for dissatisfaction; and it has already been put into operation. This gratifying result is in a large measure due to the vigorous action taken in the matter by Messrs. Carless, Capel, and Leonard, whose strongly-worded circular gave rise to our remarks.

THE COAL TRADE AND ITS LABOUR TROUBLES: TRADE UNION TACTICS IN YORKSHIRE.

The strike of coal miners in France is not quite dead, but appears to be on its last legs. The men agreed to refer their claims to arbitration; the arbitrators considered them; and their decisions have been adverse to the men. There has been much talk of "rejecting arbitration" and continuing on strike; but that is not an attitude that can long be maintained, and the men are going back to work in thousands. The effect upon the British coal trade of this strike, and the recently ended stoppage in the States, is clearly shown in the Board of Trade returns for October. Up to the end of September, the exports of British coal to France had shown a steady decrease this year; the total for the nine months giving a decline of 517,000 tons compared with 1901, and 969,000 tons compared with 1900. In the month of October there was, however, an increase of 144,000 tons over last year, and 87,000 tons over 1900; and it must be remembered that the strike did not begin seriously to affect our exports until the latter half of the month, and has not yet had anything like the effect it would have if it were prolonged until accumulated stocks in France were exhausted. Fortunately, there seems little ground to fear that event. To the United States the exports of coal last month amounted to 352,397 tons, compared with 8492 tons in October, 1901; so that the two strikes directly increased our exports by 488,000 tons, or over 12 per cent. The total shipments for the month reached 5,736,498 tons, as compared with 5,217,721 tons in 1901, and 5,113,972 tons in 1900; and the aggregate for the ten months shows an increase of about 1,500,000 tons over either of the last two years, which were record years for export.

Owing to the disturbance caused by the Pennsylvanian strike, combined with the unabated and extraordinary volume of general business in America, where the railways are quite unable to cope with the goods and mineral traffic, the demand for iron and steel in the States and Canada is still far in excess of the supply, and there is no immediate prospect of a change in the situation—though a transformation will be effected when the additions now being made to the plant there are completed and are able to obtain the necessary fuel. Meanwhile, the result is a continued outflow of iron and steel from this country across the Atlantic; and as the inflow from the Continent—which has been such a marked feature of the year's trade hitherto—is not now so noticeable, the net exports for the month show a considerable increase, being 217,000 tons, against 146,000 tons in October, 1901, and 186,000 tons in 1900. This is accounted for by the change in our trade with the States since a year ago.

The increased demand for export is not enough, however, to counterbalance the slackness in the home market, and signs of increasing depression in both the raw iron and the manufactured iron markets are to be observed. The shipbuilding trade goes from bad to worse—the freight market is in for a severe slump—and from Germany and Austria such gloomy reports are received that it is obvious that our manufacturers will have competition to meet in regard to foreign orders as keen as or keener than ever. There is, therefore, every reason to believe that as soon as the trouble in France has subsided, the coal market, which has already weakened since the American strike ended, will grow easier; and as the call for iron for the States will probably be over by the Spring, coal buyers should find themselves then in a better position than they have known for several years—provided that the market is not upset by labour troubles in our own coalfields. Unfortunately, the elements of danger are not wanting; the barometer being at "unsettled" in the Midlands (or Federation district), South Wales, and Scotland.

As evidence of the thoroughly unreasonable attitude of the Federation presided over by Mr. Pickard—from which quarter we have long scented trouble—nothing could be more conclusive than the news published the other day, that the Federation have given notice to the Conciliation Board (constituted after the great strike of 1893) that they claim an advance in the wages of their members of 10 per cent. on the standard of 1888, which would bring wages again up to the maximum allowed by the terms of the agreement between the men and the owners. Anything more preposterous, in view of the present state of the coal trade and the rates of wages current in other districts, it would be difficult for anyone acquainted with the facts to conceive; nor it is easy to imagine any move better calculated to make the coalowners of South Wales hesitate before entrusting the determination of wages to a similar Conciliation Board, as they are asked to do, in substitution for the sliding-scale method of adjustment. The Federation owners have replied by a notice demanding a reduction by 5 per cent. on standard rates; and the Board meets to-morrow to consider the proposals. The result will probably be another reference to Lord James—and we know how loyally the men received his last award. In South Wales, the owners and miners have met; the latter have explained their proposals; and the negotiations were adjourned until last Saturday. It is satisfactory, so far as it goes, to observe that the Welsh miners show no anxiety to fall in with the scheme put forward at the Southport Conference, for all wage agreements to be arranged so as to expire at the end of next year.

Whatever the future may have in store for the coal trade in the way of labour troubles, at the present moment there is only

one serious strike in progress, and that is a local affair. But it affords a remarkably complete example of the ghastly loss sometimes inflicted upon both masters and men by the sheer pig-headed pride of a Trade Union, which hesitates not to misguide and deceive its unfortunate members rather than own itself in the wrong. We refer to the strike at the Denaby and Cadeby Main Collieries, which has continued now for nineteen weeks, has cost 3000 men about £100,000 in wages, and has reduced the output of Yorkshire by some 400,000 tons—and all about nothing. The Chairman of the Collieries (Mr. J. Buckingham Pope) recently issued to all the men on strike a letter, setting out, in most moderate and friendly but firm language, the facts of the case, asking the men to resume work, and informing them that if they will not do so they must vacate the colliery houses that they have occupied for nineteen weeks without paying rent, and make way for other men who will work. This letter, which was published in the "Sheffield Independent" last Saturday week, is such a masterly document that we should have liked to reproduce it had space to-day permitted. But we can only give a bald outline of the facts set out.

The owners have done everything in the past to promote their men's welfare; so much, that the Mines Inspectors have stated that they have never found such a large number of workpeople so comfortably situated. The Company have kept the pits in regular work, stacking coal rather than lie idle; the men's wages for six months before the strike averaged 9s. 2d. per day; the collieries have never been short of hands, in spite of the great demand for miners elsewhere, because Denaby has had a good name for a comfortable job; schools, clubs, institutes of all kinds, have been supported by the collieries, and they have made it easy for the men to acquire good houses on favourable terms. For this, says Mr. Pope, "we do not expect gratitude; but we do expect fair play." This is what they get. A small dispute arises over "bag dirt." The men agree that it shall be arbitrated upon. The Arbitrators decide against the men. The Union refuses to accept the decision, and calls the men out on strike without any notice. Finding they have put the men in the wrong by this action, the Union leaders suddenly discover that the men are being paid "starvation wages," are "slaves" of the owners, and they demand an increase of 28 per cent. in wages—an increase which, says Mr. Pope, would not permit of the pits being kept working for a month against the keen competition of other districts, where wages are already actually much lower. "The Company have no more power to advance wages and continue to work the pits, than your wives have to make a stone of bread out of a pound of flour."

We should have been certain that most of the miners to whom Mr. Pope's letter was addressed felt, after reading it, that they had been very great fools, and that the officials of the Union (which is a branch of Mr. Pickard's Federation) merit a thrashing, did we not know how completely these men are in the hands of their leaders—unless those leaders have a reduction in wages to bring for their acceptance. As it is, at a meeting at which Mr. Pope's letter was contradicted but not refuted, the men decided to remain on strike, after the Secretary of the Union had made this significant declaration: "If any of them thought fit to put his signature to the ballot paper to go back to work, let him do so, but it would be 'God help him.'" Such are Trade Union policy and tactics in the coalfields!

TOXICITY OF CARBON MONOXIDE.

Those of our readers who have taken note of investigations carried out from time to time in connection with the above subject will remember the name of M. Gréhant, who has for some years identified himself therewith. He endeavoured to ascertain the exact proportion of carbon monoxide which, when inhaled with atmospheric air, would prove fatal to man and dog. At the outset, however, he encountered the difficulty of obtaining samples of air which had proved fatal, and therefore he did not pursue this investigation.

Curiously enough, the very particulars for which he was seeking were furnished by a colleague of his, Professor Angelo Mosso, of Turin, in a work published by him on "Respiration and the Action of Carbon Monoxide." The brother of this gentleman (Professor Ugolino Mosso, of the Geneva University) employed for his purpose an iron chamber in the Turin University of Physiology. Its capacity was 5740 litres (203 cubic feet), but when it was occupied by a man its contents were reduced by about 2 cubic feet. It was lighted by a glass window, and hermetically closed by a door. The vitiating gas was introduced through openings. The first experiment recorded was made on a June day; and the subject was a man named Scribante. He entered the room at 3.30 p.m., and, everything being ready, 0·177 of a cubic foot of carbon monoxide was admitted. Smaller quantities were let in at intervals up to 4.48 p.m., when altogether 0·635 cubic foot had passed, or 0·3 per cent. (1-333rd) of the capacity of the room. At 5.10 p.m. Scribante came out, declaring that he had not suffered in any way from the experiment, though he had been for a considerable time imprisoned, and for 22 minutes had breathed air at its maximum degree of toxicity. Ten days later he submitted to another experiment. When he entered the room at 3.50 p.m., his pulse was at 83, and he made 28 respirations per minute. Five minutes later, 0·177 of a cubic foot of carbon monoxide was introduced; and in three minutes more his pulse had dropped to 81—the respiration being unaffected. At 4.10 p.m., a similar quantity of the poisonous gas was admitted; and in five minutes the pulse was at 80, and the number of respirations had increased by 10 per minute. At 4.34 p.m., 0·25 cubic foot of carbon monoxide was passed in; and ten minutes later the breathing was restored to its original condition, or a drop of 10 respirations per minute. The pulse was 2 higher, or only a beat less than at the outset. A minute later, 0·14 cubic foot of the gas was introduced, making in all 0·35 per cent., or 1-285th of the capacity of the room. The subject was left undisturbed till 5.16 p.m., when he was again examined. His pulse had gone up to 86, and his respirations were 26 per minute. Four minutes later he left the room, having remained therein for 1 hr. 25 min., during 35 minutes of which he was subjected to the maximum action of the gas. Beyond a certain amount of heaviness in the head, he was unaffected by the experiment. It will be seen from the foregoing results that the first symptom of poisoning by carbon monoxide is a slight increase in the frequency of pulsation and a decrease in that of respiration, accompanied by headache.

The next experiment of which particulars are given was carried out in cooler weather—viz., during the month of March. On this occasion, Scribante took his breakfast as usual at midday, and entered the experiment-room at 4.15 p.m. Five minutes later the gas was allowed to enter slowly from a cylinder; and it was well mixed with the air by agitation. The supply was stopped at 4.37 p.m., by which time 0·92 cubic foot of gas, or 0·43 per cent. (1-233rd) of the entire capacity of the room, had passed in. At 5.3 p.m., Professor Mosso was informed that Scribante's breathing was imperceptible. On entering the room, he found the man motionless, with his head in a cataleptic position; but his arms were by no means rigid, and moved easily—neither contracting nor dropping. With the help of two men, he was dragged out of the room and laid on the floor. Breathing had ceased, and the pulse was imperceptible. Artificial respiration was resorted to, and a strong jet of compressed oxygen was directed on to the subject's face. By 5.7 p.m. all danger had passed, and respiration began—slowly and superficially at first, then deeper and more frequently. The man had violent muscular contractions, shuddered, and moved very much as one in an epileptic fit. On being called by name, he opened his eyes but did not speak. He relapsed into a state of depression when the administration of oxygen ceased. By 5.9 p.m. consciousness had returned; but he remembered nothing about what had passed. His pulse was beating at the rate of 120 per minute.

This experiment *in corpore vili*, which happily was unattended by fatal consequences, definitely fixes a numerical datum which M. Gréhant regards as one of the highest importance—viz., that the proportion of carbon monoxide in air fatal to man is 1-233rd, or 0·43 per cent. Having ascertained this, he carried out some experiments with the view of finding out whether a dog could exist in an atmosphere vitiated to this extent. It is unnecessary to give details here, but merely to record that the animal died after an exposure of about an hour's duration. The heart continued to beat for two or three minutes after respiration had ceased. On the abdomen being opened, bright red blood was found in all the veins. A portion drawn from the inferior *vena cava*, examined, showed a high percentage of carbon monoxide. Part of the venous blood was agitated with oxygen for measuring the respiratory capacity, and the result demonstrated unmistakeably that it was greatly oxy-carbonated, and could absorb but little oxygen. This caused the animal's death.

These experiments justify M. Gréhant in giving 1-233rd as the proportion of carbon monoxide sufficient to cause the death of man or dog, as the results arrived at accord very well with those he has already published.

MUNICIPAL AUTHORITIES AND THE LABOUR ELEMENT.

The fact that at the recent provincial municipal elections, the "labour candidates" gained some 24 seats, will have been noted with regret and misgiving by those who are concerned for the efficient administration of local government, and who realize the dangers involved in the growth of "Municipal Socialism." A striking example of what is expected of labour members of local bodies by the Trade Unions which support and practically elect them, was rescued from the obscurity of the local newspapers and recounted in "The Times" recently by the writer of the now famous articles on "Municipal Socialism." The bodies concerned are the Poplar Board of Guardians and the Gas-Workers' Union; and the particulars are as follows: At a meeting of the Poplar Guardians in September last, a report by the Casual Ward Committee was brought up in reference to the conduct of a man named Geeson, "general assistant and stoker at the casual ward," and formerly one of the Guardians. The Committee made various complaints against Geeson—the chief being that he had used abusive language towards the Superintendent, had also "put his fist in his face," and had refused to obey orders or to

leave the premises. There had, in fact, been trouble with him ever since he was given the post. The man had now elected to resign; and the Committee recommended that his resignation should be accepted. Here steps in Trade Unionism. "Letters were received from the Gas Workers' Union, and from the Poplar Trades' Council, asking to be allowed to interview the Board with reference to the matter;" and a member proposed that deputations be received. This, however, was too much for all but three labour members. A Mr. Lansbury, a Trustee of the Gas-Workers' Union, strongly opposed the motion, remarking that "Geeson had had a very soft job, but if the price of a seat on that Board was the giving of soft jobs to their friends, then he would not sit there. He appealed to the Board not to receive the deputations. Let them tell these bodies that they were perfectly ready to receive them upon matters of Trade Union principles, but not on questions of discipline (*Loud hisses from the gallery*)." This protest was supported by another member of the Gas-Workers' Union, a Mr. J. R. Smith; and, as a result, the motion was lost by an overwhelming majority. The stand thus taken by Lansbury and Smith, and one or two other labour members, was eminently to their credit. But mark the result.

A letter has been recently published in the "East End News" from the Secretary of the Bromley Branch of the Gas-Workers' Union, stating that at a meeting on the 6th ult., Mr. J. R. Smith and Mrs. Cordery, both members of that branch, had been called upon to resign their seats on the Poplar Board of Guardians, and Mr. Smith to resign his seat on the Borough Council also—Mr. Smith, on account of the speech delivered by him in regard to the receiving of deputations from the Gas-Workers' Union and the Poplar Trades' Council by the Board of Guardians, and Mrs. Cordery for not voting for the reception of such deputations. Mr. Lansbury having appeared before the branch meeting and explained his reasons for voting as he did, was not asked to resign his seat; but the Executive Council of the Union have been asked to remove him from his position as Trustee. The ground upon which the Union called on the members in question to resign their seats was, that the Union had paid their election expenses on condition that they would resign if the branch required them to do so for having done anything "against Trade Unionism."

The morals to be drawn from these facts are well defined by the writer of the articles in "The Times," as: First, that members of local governing bodies constituted like Poplar provide their friends with nice soft jobs. Second, that such bodies, elected mainly through the Trade Unions, are in danger of becoming far too much mixed up with Trade Union influences and coercion in regard both to labour and to votes. Third, that their proceedings are liable to unseemly interruptions, if not to actual intimidation, on the part of municipal workers and other representatives of democracy seated in the strangers' gallery. Fourth, that a Trade Union will pay the expenses, and secure the return, of labour members on the express understanding that they will resign if anything they may do is "against Trade Unionism." Fifth, that a refusal on their part to tolerate the interference of a labour union between a public body and its servants on a matter of discipline, comes under the definition of being "against Trade Unionism." And, lastly, that a labour member is liable to be called before a branch of the Trade Union to which he belongs, to explain his conduct in voting contrary to its wishes, and is liable to punishment and disgrace in the eyes of his fellow trade unionists by being deprived of his position as Trustee. And yet the number of municipal labour members is increasing!

NEW LITERATURE OF THE GAS-ENGINE.*

THE student of the gas-engine, whether for objects connected with its use as a prime mover, or in regard to its design and construction, should not experience any difficulty in obtaining all the information on the subject that may be derivable from print. Whether his attention is attracted to the higher developments of this kind of motor in point of size, or to the very interesting portable forms of the explosion engine employed in the fast-growing industry of "automobiles," there is no lack of professional guides to the intricacies of the subject. Indeed, in nothing is the mechanical engineering of the present more conspicuously modified from the same description of technic of only ten or fifteen years ago, than in this particular. It seems only yesterday that the manufacture of gas-engines was a limited speciality, engaged in by a few English and Continental firms; while the popular applications of the motors put upon the market were few and of even narrower limitations.

This order of things has been completely changed, until now the question as regards the choice of a prime mover is not whether the gas-engine is available as an alternative to the steam-engine, but whether it is not to be preferred to it. For particular reasons arising out of the revival of interest in producer gas as a source of power, Mr. Herbert A. Humphrey has been led to pass in review the resources of English and Continental mechanical engineering in the matter of large gas-engines; and the fruit of his labours, collected in the form of a British Association paper, is a compendium of facts which possesses high value for the time being. We put this qualification upon Mr. Humphrey's paper advisedly, because, from the very nature of his work, it can only have a transitory significance. It is expedient, in passing, to record the important statement in this connection of Mr. E. Hopkinson, made in a recent letter to the "JOURNAL," as to the complete success of the direct driving of dynamos by gas-engines. At the present time, when manufacturers of both gas and gas-engines are confronted with the demand for cheap electricity generation for all purposes, it is of the greatest importance that superstitions respecting what gas-engines cannot do should be exploded wherever met with. The driving of alternating generators in parallel is an instance of this mischievous sort of tradition, and it is well the true state of the matter should be known.

Gas-engines, it is understood, have drawbacks of their own, and do not deserve to be saddled with others which are mere prejudice. As regards the driving of alternators in parallel, it is not so long since there was more than a little difficulty in effecting this by means of a steam-engine. Mr. Humphrey has rendered the cause of the gas-engine good service by dispelling the mathematical mystery that was encrusted on and about this effect, and especially in incidentally exposing the weakness of the older style of gas-engine design which sought to attain regularity of revolution by exaggerating the office of the fly-wheel. This is a point to which the attention of the student should be particularly drawn. Mr. Humphrey says uncompromisingly that "the fly-wheel should be made the last resource for securing a good cyclic variation, and attention first devoted to obtaining a uniform crank effort by an increased number of equally-timed impulses per revolution, and a good balance of the reciprocating parts." The significance of this warning is one of the points of enduring value in the paper; for the reason that it supplies the key to all the efforts of such inventors as Körting and Oechelhaeuser to improve the gas-engine as a prime mover.

It is these efforts—which are not, of course, confined to the individuals above named—that are noteworthy as steps in the forward direction from the rut of the Otto cycle, which every maker of a cheap gas-engine rushed into the moment the master-patent expired. It looked for a period as though this event were destined to prove one of the worst misfortunes that could happen to the gas-engine, because the manufacture of cheap and serviceable machines upon the Otto model seemed to be the sole ambition of firms in the trade. It was not long, however, before the necessity for increasing the size, and adapting the motor to new and larger applications, overbore this artificial limitation. The point here is, that what is known as the large gas-engine, as distinguished by Mr. Humphrey, is not only more powerful, but is an altogether different machine from the stock article. Unless this truth is realized, and well driven home, there will be some risk of the efforts of the advanced makers of so-called large gas-engines being undervalued by those who regard price as the chief consideration. It is a question of what the engine will do, as well as of what it costs; and the cheap device of putting an enormous weight of metal into a fly-wheel, in order to obtain steadiness of revolution, has been quite sufficiently drawn upon.

As is so often observable in the progress of engineering, the advances actually made good by the foremost of the gas-engine designers are not of the kind that critics of the technic looked for. Those who considered the heat balance-sheet of the Otto engine years ago, did not expect much in the way of the improvement of the motor or the extension of its applications, until the ascertained extravagance of working with an artificially-cooled cylinder should be corrected. The objection has been overruled by the employment as the motor fuel of a kind of gas which it scarcely pays to economize. This is perhaps an exaggerated way of putting the case; but the truth is, that the call for economy which was so much regarded by those whose first thought was of the cost of the gas consumed, ceased to be heard when it was a question rather of utilizing in this way a gas which cost nothing at all. Consequently, the quest of the hot-cylinder gas-engine, which was assumed to be the way to improvement of the gas-motor of ten years ago, has dropped out of the scheme of gas-engine development. Fortunately so, because the way has thus far proved a "No Thoroughfare." Some considerable amount of headway has been made in another direction; but this is not to say that the old assumption was either not justified, or was unnecessary. The gas-engine, truly, has made a fresh start in point of size, through the neglecting of an obvious source of extravagance. Simultaneously, as the increased power of the gas-motor thus obtained rendered it available for applications, such as the generation of electricity in large quantities, which could not be touched so long as the units of power remained small, the mechanical improvements of the machine with which such names at Körting and Oechelhaeuser are identified, followed without reference to the neglected extravagance. The old assumption, however, retains all its rationality; and no student of the gas-engine will be safely guided who does not appreciate its force. Whenever the cost of the gas used for the generation of the power ceases to be negligible, the familiar

* "Gas and Petroleum Engines. A Manual for Students and Engineers." (Finsbury Technical Manuals.) By Professor W. Robinson. Second Edition, completely rewritten, with 474 illustrations. London, E. & F. N. Spon.
"Recent Progress in Large Gas-Engines." A Paper read at the Meeting of the British Association, by Herbert A. Humphrey.
"A Preliminary Note on Gas-Engine Explosions." A Paper read at the Meeting of the British Association, by H. E. Wimperis, B.A.

objection must at once reappear, albeit in the reduced dimension in which intermediate improvements may leave it.

The work of Mr. Wimperis is interesting in this connection. He has not allowed the considerations which have gone to make the large gas-engine a practical success to distract his attention from the extravagance of the motor in regard to the heat of the gas consumed. Some time ago, the hypothesis of a variable specific heat for the gases of combustion, according to temperature, was framed by Hirn, and corroborated by the researches of Mallard and Le Chatelier. Students of the ordinary text-books on heat will remember that there is no allowance made for any variation of the specific heat of gases with the temperature. Whether the temperature was high or low, the gases were assumed to have the same capacity for heat; and all calculations of the resultant (theoretic) temperature of combustion were made on this basis. Very high figures were obtainable in this way, and large losses represented the discrepancy between calculation and experiment. It is Mr. Wimperis's point that if proper correction is made for the rise of specific heat of the gases of combustion with the temperature, the old theoretical loss of 50 per cent. by gas-engines, which nobody could account for, comes down to the reasonable figure of about 10 per cent. If, in addition to this, allowance be made on a reasonable hypothesis for cooling during explosion, the whole apparent deficit can be accounted for. This is to "take up the slack" of theory in a satisfactory fashion.

Professor Robinson's manual is intended for class instruction; and it reads like it. We cannot admire the Professor's style of composition, which is both jerky and loose. For example, what is to be made of the sentence, on p. 10, that "the most recent *application* of the gas-engine is in the utilization of the waste gas from the blast-furnace for motive power in the engine cylinder." Surely, this is an *adaptation* of the gas-engine, which might find an application to the blowing of air, or the driving of a dynamo? Again Professor Robinson lays it down generally that "increase in compression of the charge means greater economy of gas per hour per horse power." Without limit? The Professor's manner of expressing himself is, we should expect, far from easy for a neophyte to follow. He occasionally mixes up principles and details in a decidedly irritating manner. The matter is good; but systematic arrangement is lacking. We do not like to appear captious in criticizing a technical book; but, surely, for the purpose which this book is designed to serve, the utmost clearness of diction, and the most careful arrangement of the matter, are as much to be desired as its trustworthiness. Moreover, there is a good deal included in—we had almost written, "swept up into"—this book which might have been left to be ascertained from the usual books of tables. There should be some self-restraint on the part of book makers, who might spare their patrons the cost of the "padding." Is it really necessary to reprint Boyle's law and the facts about "latent heat" in every book of the gas-engine? Especially, is not there any agreement among the various Professors at Nottingham, or Finsbury, as to the constants that should be assumed in all cases? Must everything be reproduced every time? Let us give Professor Robinson's conclusion of the whole matter, in his own words: "After all, gradual combustion with rapid and continuous evolution of heat for a brief period is best for durability in the working of ordinary pieces of mechanism. Mixtures of acetylene and air tend to explode in the shocking way, which must be avoided [True, very true!] since the inconveniently high pressures produced, and the sudden shocks, cause mechanical stress which only great strength of metal can withstand."

GERMAN AND AMERICAN METHODS OF GAS ANALYSIS.*

THE translation by Professor Dennis of the second German edition of Dr. Hempel's well-known work on gas analysis was published ten years ago, and great advances have been made in the interim in the application of exact and rapid modes of analysis to the examination of the gaseous mixtures which are either generally met with in industrial establishments, or are peculiar to certain important technical processes. There should obviously be a very wide field of application for simple methods, directly or indirectly analytical, by which the working of furnaces—whether fed by solid or gaseous fuel—may be readily checked and controlled. On the other hand, the scope of analytical methods dependent, for instance, on the measurement of a volume of silicon tetrafluoride (such a method is described by Dr. Hempel for the determination of fluorine in teeth) must necessarily be very limited.

The new edition by Professor Dennis of Dr. Hempel's work, now before us, essays to treat of both the more universally applicable methods of gas analysis, and all the more important methods having only special applications. The programme is a comprehensive one, and, on the whole, has been excellently executed, as might be expected of such competent authorities on gas analysis as Dr. Hempel and his American collaborateur. We know of no other work which covers the same ground, and of very few which cover any portions of it so well as this latest edition of Hempel. It must not be supposed that the present work is merely a reprint of the 1892 English edition, after a few corrections have been extended to it, or even a bald translation of the latest German edition. It is much more; the revision has been drastic, and many entirely new branches of the subject have been dealt with, so that we are able to say with conviction that those gas analysts who already have the earlier edition should not be without the new one.

The work, nevertheless, by no means fulfils our ideal of what a standard book on gas analysis should be. It exhibits, as do other works on gas analysis by German authors, an ignorance of the advances made by English chemists in methods and apparatus for the more accurate and more speedy determination of constituents of gaseous mixtures. For instance, it is said that "Pettersson was the first to show that, by means of a tube enclosing a volume of gas, it is easy to compensate the error which would result from variations in the pressure and temperature of the atmosphere." But actually the use of such a compensating tube was adopted by Messrs. Williamson and Russell in 1868—long before Pettersson suggested it—as reference to the "Journal of the Chemical Society" for that year will show. The convenient apparatus devised by Dr. J. S. Haldane for the rapid determination of carbonic acid in air, which is recommended in the blue-book on the "Ventilation of Factories" noticed in last week's "JOURNAL," for adoption in checking the efficiency of the means of ventilation employed, is a good example of the application of the Williamson and Russell compensating tube. It is true that in Dr. Haldane's apparatus a far more sensitive pressure gauge is used than the mercury gauge of Williamson and Russell; but there is less in common between it and Pettersson's apparatus, which requires extremely careful manipulation.

A portable form of apparatus for the determination of carbonic acid in air, designed by Herren Pettersson and Palmqvist, is described in the volume before us; but a comparison of it with the delightfully simple, and at least as accurate, apparatus described in the recent blue-book is distinctly favourable to Dr. Haldane's form. Actually it is an analytical triumph, on which the eminent physiologist deserves cordial congratulation, to have devised a method by which, with a sample of air contained in a bottle of 2 oz. or even 1 oz. capacity, the carbonic acid may be estimated in about three minutes with an error not exceeding 0·5 volume per 10,000 volumes of air. Scarcely so high a degree of accuracy is claimed for the portable apparatus of Herren Pettersson and Palmqvist, and certainly more time is spent on the determination, while the apparatus is obviously more fragile and less easy of manipulation. We think some mention of Dr. Haldane's useful and convenient apparatus, which we believe was first described in scientific papers more than four years ago, should have been made in the course of the many pages which Dr. Hempel and Professor Dennis devote to the determination of carbonic acid in air. The method is only surpassed in accuracy by the gravimetric method, as improved by Drs. Haldane and Pembrey in 1890; but, curiously enough, we find no reference to this method in the book before us. The mean error in the amount of carbonic acid found by this method is only 0·1 per cent., and the error in any individual determination of carbonic acid in air should not exceed 0·05 volume per 10,000 volumes of air. No method is described in the book which pretends even to approach this degree of accuracy.

What we have said above illustrates aptly the fault of the book—viz., it ignores much of the best work in this country in regard to methods of gas analysis. It is a pity, from our point of view, that the translation and re-editing of the original German work was put in American hands; for the book thus lost the opportunity of becoming properly anglicized. This remark is directed mainly to the subject-matter, but applies also to the less important points of spelling and construction.

To the gas-works chemist, the most interesting portions of the new edition of Hempel and Dennis are those dealing with furnace gases and illuminating gas. With regard to products of combustion or chimney gases, it is said that "it is quite sufficient to make merely a determination of the oxygen, for the amounts of all other products of combustion are, of course, dependent upon the oxygen, provided that the furnace is not giving off thick clouds of smoke—*i.e.*, that, instead of burning, the fire merely smoulders." We think this statement needs amplification to make it applicable to the case of retort-furnaces with gaseous firing, though determinations of oxygen only in the chimney gases amply suffice for the proper control of ordinary furnaces. In retort-furnaces fired by producer gas, incomplete combustion is common. It is customary—and, indeed, correct—to work them with a very small excess of air; but frequently excess gives place to a deficiency, and then loss of fuel occurs. Owing, moreover, to imperfect admixture of air and gas in the furnace, some carbon monoxide may survive even when the chimney gases contain 1 or 2 per cent. of oxygen. Hence the oxygen determination alone is not a wholly satisfactory check on the working of gas-fired furnaces; and a careful superintendent will occasionally have carbon monoxide sought for, and, if present, determined. The carbon dioxide is usually ascertained as a preliminary step in the determination of the oxygen. In cases where the efficiency of the firing is checked by one or other of the mechanical devices which

* "Methods of Gas Analysis." By Dr. Walther Hempel, Professor of Chemistry in the Dresden Technische Hochschule. Translated from the Third German Edition, and Considerably Enlarged. By L. M. Dennis, Professor of Analytical and Inorganic Chemistry in Cornell University. New York: Macmillan Company. London: Macmillan and Co., Ltd.; 1902.

aim at estimating the percentage of carbon dioxide in the chimney gases from a determination of their density, it is especially necessary to ascertain from time to time by analysis that what appears to be a slight excess of air is not in reality a deficiency. One of the best known of this type of apparatus is Arndt's Econometer, of which the book before us very quaintly says, "the gas-balance original with Arndt has been found to be quite satisfactory."

Turning to the chapter on "Illuminating Gas," we are told that its examination comprises: (1) A photometric measurement of the illuminating power of the gas [the tautology is not ours]; (2) the determination of the specific gravity of the gas; (3) the determination of tar and the constituents separable by cooling; (4) the volumetric analysis of the gaseous constituents; (5) the determination of sulphur; (6) the determination of ammonia; and (7) the determination of carbon dioxide. Then follow, under each of these seven headings, brief particulars of the methods of procedure recommended.

The measurement of the illuminating power of coal gas is described according to the practice which prevails in Germany, and—we believe—nowhere else. The gas is to be burnt in the so-called normal burner of Elsler (*sic*), at the rate of 150 litres per hour, and the light compared with that afforded by the German paraffin standard candle or the Hafner-Alteneck (*sic*) lamp. Of what practical value will these directions be to readers of the English version of the work, even if they should possess a Hefner lamp, and should obtain an Elster argand burner. The author and translator-editor must certainly confess that "none at all" would not be a very unfair reply to make to this query. Why did they not take the trouble to have this portion of the work re-written, so as to make it of some service to English and American readers?

Passing on to the volumetric analysis of "illuminating gas," the directions given are good. The procedure described is said to give, with careful work, determinations of hydrocarbon vapours, carbon dioxide, heavy hydrocarbons, oxygen, and carbon monoxide, exact to about 0·2 per cent.; but the experimental errors in the analysis of the marsh gas, hydrogen, and nitrogen may, it is stated, rise to 1 per cent. Such results are, of course, sufficiently exact for almost all practical purposes. Higher members of the paraffin series than methane were sought for, but not found, in "ordinary illuminating gas," by which, of course, is meant ordinary coal gas. The translator would, we think, have been well advised to have given a less literal rendering of the German "leuchtgas" than "illuminating gas," because the German word is in practice synonymous with "coal gas." In America and some places in England, however, illuminating gas, as supplied from gas-works, is by no means wholly coal gas; and the remarks made as to the absence of the higher members of the paraffin series are certainly incorrect in regard to illuminating gas which consists wholly or partially of carburetted water gas. Dr. Hempel was writing of coal gas, and not of illuminating gas in general, and the translator-editor should have saved his remarks from the misinterpretation which will now most certainly be their lot in the United States, and, to a less extent, here.

The determination of sulphur in illuminating gas is dealt with fairly fully and thoroughly according to the lights of the German author and American editor. The general analytical methods given are good; but there is no mention of the special means which have been elaborated in this country to facilitate the rapid detection and estimation of the sulphur and other impurities in coal gas. For instance, the method described for the determination of the total sulphur in illuminating gas is greatly inferior in respect of convenience and reliability to both the Referees' and Mr. Harcourt's method, neither of which is mentioned in this book. The determination of ammonia is very cursorily dealt with, and only one method (Rüdorff's), with which we are not familiar, is given for determining the carbon dioxide in illuminating gas. Yet these are very important determinations on gas-works, quite apart from all statutory regulations in respect of impurities.

It will have been surmised from what we have said as to the book not having been anglicized, that the cubic metre (or rather "meter") and that the litre ("liter") take the place of the cubic foot throughout; so that for gas-works use in America and in this country many troublesome calculations will have to be made before the directions and conclusions become serviceable. The translator-editor should have saved his readers the labour of making these calculations for themselves.

Notwithstanding the imperfections which we think mar the utility of the work before us, so far as the majority of readers of the "JOURNAL" are concerned, it is on the whole likely to be useful in gas-works laboratories, especially as a guide to good methods for the ordinary volumetric analysis of gaseous mixtures, such as coal gas, producer gas, &c.

A cheap varnish can be made, according to "La Chimica Industriale," by mixing 100 parts of casein, from 10 to 25 parts of solution of soap, and from 20 to 25 parts of slaked lime, with from 25 to 40 parts of oil of turpentine. The whole should be diluted with water until the proper degree of fluidity is attained. When this varnish has to be kept a long time before use, ammonia must be added to prevent precipitation of the caseate of calcium. The product thus obtained dries quickly, and is insoluble in water. It can be coloured to any tint, and is excellent for walls, or for wood and even metal vessels.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 1356.)

BUSINESS on the Stock Exchange was rather more active perhaps on the whole last week than in its predecessor. But the general tendency was very drifty, and inclined to see-saw. It opened badly under the influence of the American Market, which was very weak up to the close. Then it rallied, and then again fell back, and so on. Wherever a profit could be snatched, it was quickly pounced on. The Funds were better, and so were Home Rails, but not much else. The settlement was not a formidable affair, and was easily adjusted. In the Money Market, there was a good demand both for the Stock Exchange and other requirements; but the supply was fully adequate to meet them all, and discount rates were steady. In the Gas Market, there was a great falling off in point of volume, and transactions were decidedly limited; so much so that on no one day of the week did the aggregate of transactions reach even a moderate figure. There was no general tendency to speak of. Changes of quotation were not numerous or considerable; and there were as many in the upward direction as in the other. And the leading issues were not at all affected. In Gaslight, there was a little quiet business done in the ordinary shares, and the price looked very much as if the quotation was going to fall; the stock frequently changing hand at 88. However, the nominal figures were left standing. Transactions in the secured issues were very moderate, and prices were only moderate too. Hardly anything was done in South Metropolitan, and the prices realized seemed to point to a probable shrinkage in the quotation; but no change was actually made. Not a single transaction was marked in Commercials. There was very little business to speak of in the Suburban and Provincial group; but it reckoned a large proportion of the changes in quotation. British had a slight rise, and Southampton a considerable one. In their local Exchanges, Liverpool underwent a reduction, and Sheffield fell a point in all three issues. The Continental Companies were very quiet. Imperial was a shade easier, European was steady, and Union preference recovered from its fall of the previous week. There was nothing in connection with the remoter undertakings to call for notice. The Water Companies revived considerably, taking a more rosy view of their prospects under the Government Bill; and several issues had a smart rise.

The daily operations were mostly at a dead-level. Southampton rose 2 on Monday. On Tuesday, East London Water gained 1. On Wednesday, Bombay fell ¼. On Thursday, Union preference rose 2. In Water, Lambeth rose 2½, and East London 1. On Friday, British improved ½. In Water, Chelsea rose 10, Kent and West Middlesex 5 each, and Lambeth 2.

THE LATE MR. JOHN AYRIS.

IN the "JOURNAL" last week, we briefly recorded the death, on the previous Saturday, of Mr. John Ayris, M.Inst.C.E., who for about 52 years was connected with the Norwich Water-Works Company, of which undertaking he was the Managing-Director at the time of his decease.

He commenced his career as a civil engineer under the late Mr. J. G. Lynde, who was one of the pioneers of water, gas, and other undertakings; and in 1849 he was sent to Norwich to prepare plans and collect evidence for promoting a Bill to form a Company for supplying the city with water. Curiously enough, the water-works were then in the hands of the Corporation, who from the beginning of last century had given the city a supply from the River Wensum. It was found, however, to be insufficient; and, in the above-named year, steps were taken to improve it by private enterprise. The works proposed consisted of a pumping-station, filter-bed, &c., at Heigham, and a reservoir at Lakenham; and they were completed in September, 1851. Mr. Ayris, acting for Mr. Lynde, was closely in touch with carrying out the detail work; so that from the commencement he was associated with the Norwich Water-Works, which in after years were examples of completeness, efficiency, and excellent order. As Mr. Ayris had been identified with the works from the beginning, and had shown signs of great ability, he was appointed Manager while still quite a young man, and held the position for 44 years. He had many anxieties and difficulties to contend with in the early history of the Company; but, by indomitable energy and perseverance, he was able to make for himself a reputation, and his services and assistance were sought in various parts of the country. In addition to being a member of the Institution of Civil Engineers, his name was on the roll of the Gas Institute; he having joined the British Association of Gas Managers in 1877.

When the late Dr. Pole was appointed by the Local Government Board to investigate the subject of the constant supply of water, he received great assistance from Mr. Ayris; and his services were appreciated by the late Mr. T. Hawksley in connection with the carrying out of works designed by his firm. In addition to his Norwich appointment, Mr. Ayris was Manager of the Great Yarmouth Water Company, the Lowestoft Water and

Gas Company, and the Southend Water Company; and for some years he was on the staff of the Sheffield Water Company as Consulting Distributing Engineer. For all of the above Companies he carried out extensive and important works, and also attended to the details of their managerial and financial affairs. He took a prominent part in the transfer of the Stockton and Middlesbrough, Sheffield, Limerick, and some other water undertakings, to the respective local authorities. The last time he was engaged in parliamentary work was in 1898, when the Norwich Company promoted a Bill to obtain further powers, and were opposed by the Corporation.

The late Mr. Ayris was a far-seeing man, and was ever on the alert to keep the works for which he was responsible equal to the maximum demands upon them; and in his hands the undertakings of all the Companies with which he had to do were vastly extended. When his health began to fail, he gave up the management of the Great Yarmouth, Lowestoft, and Southend Companies, and eventually, about the end of 1900, he relinquished the detail work at Norwich. But, as mentioned above, his connection with the concern was not severed. When he retired from the service of the various Companies, he was presented with appreciative testimonials; and his appointment as Managing-Director at Norwich was accompanied by a salary of £1000 a year for life. In 1895, he removed to Great Yarmouth, were he lived very quietly. He leaves a widow, four daughters, and three sons, as well as a large circle of friends. The funeral took place at Norwich Cemetery on Thursday. In compliance with the latest expressed wish of the deceased, his body was laid, by the kindness of the Directors, for its last night on earth in the room of the Company's offices in Surrey Street, Norwich, where he had spent so many days of thought and work. Thence it was conveyed on Thursday afternoon to St. Stephen's Church, where the first portion of the service for the burial of the dead was recited. The hearse, the sides and top of which were completely covered with lovely flowers, was followed by 23 carriages. At the cemetery, there was a considerable gathering of mourners round the grave, including some of the old employees of the Company, to witness the deposit in their last resting-place of the remains of one who, during his life, had endeared himself to many.

PERSONAL.

PRESENTATION TO MR. WILLIAM A. VALON.

TWENTY-FIVE years or so have sped away since Mr. W. A. M'Intosh Valon first entered upon the duties of Borough Engineer and Manager of the Gas and Water Departments of Ramsgate; and, when one remembers the vastness of the work he has accomplished for the popular seaside resort—public work of many kinds and extent which only an engineer similarly talented could have conceived and carried to completion at corresponding lowness of cost and with such happy results for the town—it is not a matter for astonishment that the leaders of Ramsgate should have desired, on his retirement from direct official connection with them, to place in his hands something which should be, by constant presence at home, commemorative of the high esteem and warm appreciation in which they held him and his work. Consequently, the members of the Council and the Magistrates of the town subscribed for a suitable gift for him. The whole matter was privately arranged and the actual presentation publicly made, which must give to the exquisite memento a pleasing double value in the eyes of the recipient. The testimonial consists of a lovely table centre-piece, nearly 3 feet high, and of solid silver. It can be used either for decorative purposes generally (fruit, flowers, &c.) or the dishes can be removed, and the stand used as candelabra. Accompanying the epergne are two solid silver and delicately chased side dishes. The centre-piece bears this inscription: "Presented to W. A. Valon, C.E., J.P., by members of the Council of the Borough of Ramsgate and other friends, on his retirement from the post of Engineer to the Gas and Water Undertakings of the Corporation. Ramsgate, Nov. 8, 1902."

The presentation was made on the date named, in the Council Chamber, which was occupied by a large representative gathering, including ladies. Among the gentlemen were the Mayor (Alderman H. H. Green), Mr. C. J. Gwyn, Chairman of the Corporation Gas and Water Committee, Mr. T. N. Ritson (Mr. Valon's successor), and quite a number of J.P.'s, among whom was the Chairman of the Bench. We cannot report all the things said in Mr. Valon's praise; but it may be mentioned that, in making the presentation, the Mayor remarked that, upon Mr. Valon's retirement from the position of Engineer and Manager of the gas and water departments, a number of his friends considered the occasion should not be allowed to pass without their showing in some tangible form the appreciation and esteem in which their friend had been held during that long period. He need not go through all the work done by Mr. Valon during his long term of service. They all knew how the gas-works had been remodelled and reconstructed, forming one of the finest works in the kingdom, he believed, for their size. They also owed Mr. Valon a very deep debt of gratitude for the great skill and ability he had displayed in supplying the town with water. When they found their neighbours in adjoining towns so perplexed with their water supply, it was satisfactory to know that the provision made by Mr. Valon was of such a character as to be greatly beneficial to the town. Whatever work Mr. Valon had undertaken, he had done conscientiously and well; and they had always been able to feel that he was guided by most straightforward motives, and whatever he said was to be relied upon by those whom he was serving. In his concluding remarks, his Worship wished Mr. Valon every possible success.

Quite a number of speakers followed, who separately made appreciatory remarks on the different branches of work that Mr. Valon had accomplished for the town. In his acknowledgment, Mr Valon thanked those present for their great kindness, and afterwards paid a tribute to all—from the highest to the lowest—who had aided him in carrying on his work. In reference to the gas and water departments, he mentioned the facts that when he first went to Ramsgate, the make of gas was about a fifth of the present consumption; and the water consumption had increased in exactly the same proportion. He reminded the company that whatever anxiety there may have been in connection with the gas, the water had been a greater anxiety. In this connection, he also congratulated the town on having persevered and acted on the lines that had been set before them, and resolved that the water supply should leave nothing to be desired. He again thanked the subscribers for the handsome present, which would, if it were possible, cause his family even more gratification than it gave to him. As all present knew, he was not to lose his interest in Ramsgate. He still held the appointment of Consulting Engineer to the Corporation; and in this capacity he would not lose touch with the Council. He was also an owner, though not at the present time an occupier, and therefore would not lose sympathy with the ratepayers. He hoped, when time permitted, to devote some of it to the magisterial bench; and though now resident away from Ramsgate, it was possible, under the altered conditions, he might be able to do so more frequently than he had done in the past. It was an honour that he highly appreciated, although circumstances had prevented him devoting as much time to it in the past as he would have wished. Mr. Valon's remarks were received with applause.

We learn that Mr. JOHNSON, Assistant to Mr. J. H. Brown, the former Engineer and Manager of the Ilford Gas Company, will until next March discharge the duties of the position vacated by Mr. Brown.

Mr. C. D. T. BUSHELL, the Chairman of the Gas Committee of the West Bromwich Corporation, has resigned his seat on the Council. In virtue of his position, Mr. Bushell figured prominently in a recent discussion on "Gas *v.* Electricity."

Mr. WALTER FREDERICK VERNON, Manager of the Kincardine-on-Forth Gas Company, has been appointed to a similar position with the Coupar-Angus Gas Company. Mr. Vernon is a native of Kelso, and has been two years in his present situation.

As will be seen by the report which appears in another column, Mr. M. WILSON HERVEY, M.Inst.C.E., the Engineer of the West Middlesex Water Company, has resigned his position, to which Mr. H. FILLMER RUTTER, Assoc.M.Inst,C.E., one of the Company's Assistant-Engineers, has been promoted.

His Majesty the King has been graciously pleased to grant a Charter of Incorporation to the Institute of Secretaries (founded in 1891), which will henceforth be designated "The Chartered Institute of Secretaries of Joint-Stock Companies and other Public Bodies." The first President under the Charter is Mr. ARTHUR H. CANE, Secretary of the Reading Gas Company.

Mr. HENRY R. SMITH, Assoc.M.Inst.C.E., has retired from the position of Resident Engineer of the Portsmouth Water Company, after thirty years' service, and has been granted by the Directors a pension of £300 per annum for life. He is succeeded by Mr. HERBERT ASHLEY, Assoc.M.Inst.C.E., late Assistant-Engineer to the East London Water Company, who will take the title of Chief Resident Engineer.

In the list of Birthday Honours, we are pleased to notice that Mr. H. J. CHANEY, Superintendent of the Standards Department of the Board of Trade, has been made a Companion of the Imperial Service Order, lately instituted by His Majesty for members of the Civil Service, as a recognition of meritorious discharge of duty. Mr. Chaney it may be remembered is the author of an interesting work on "Our Weights and Measures."

We are sorry to learn that Mr. T. L. SHEPPARD, the Manager of the Farnworth and Kearsley Gas Company has, in consequence of ill-health, tendered his resignation, the date of which, by a curious coincidence, was that of his appointment. He has held the position for 26 years, and his predecessor occupied it for 22 years—in fact, from the formation of the Company in 1854. Mr. Sheppard has been requested by the Directors to allow the resignation to stand over for three months, for which period he had been granted leave of absence.

The position of Chief Clerk and Accountant to the Canterbury Gas and Water Company, for which applications were invited in the "JOURNAL" towards the close of last month, has been obtained by Mr. W. A. KING, who has been for some years with the Aldershot Gas and Water Company. He entered their service in 1884, and was for three years in the fittings and

distribution department. He was afterwards appointed junior clerk, and subsequently rose to be Chief Clerk and Cashier—a post which he has filled for twelve years. He will enter upon his new duties on the 1st prox.

On the occasion of the election, on Monday last week, of a successor to Mr. J. A. Bellamy, J.P., the Chairman of the Plymouth Gas Company, as Mayor of the borough, it was decided to present him with an illuminated address, conveying the thanks of the Town Council to him for his able and courteous conduct during his period of office, and placing on record their high appreciation of the arrangements made for welcoming their Majesties the King and Queen, when they visited the West of England, and of the manner in which he had upheld the credit and dignity of the borough on that auspicious occasion; and also of the great service he had rendered to the town in inducing His Royal Highness the Prince of Wales to accept the position of Lord High Steward of the borough, in succession to His Majesty.

Mr. Laurie Trewby, son of Mr. G. C. Trewby, Chief Engineer of the Gaslight and Coke Company, is leaving the gas and electric lighting works of the Leicester Corporation, after a pupilage of about seven years under Mr. Alfred Colson, M.Inst.C.E., M.Inst.E.E., to take up the position of Engineer and Manager at the Mill Hill works of the North Middlesex Gas Company. For the past four years Mr. Trewby has filled the position of Chief Assistant at the Aylestone Road works with marked ability, gaining for himself the respect alike of his chief, his brother officers, and the workmen. On Wednesday last, in the reading-room at the works, in the presence of representatives of the staff and men, Mr. Trewby was presented, through Mr. Colson, with a handsome clock and aneroid barometer. Regret at his removal, and hearty good wishes for his future success, were expressed, to which Mr. Trewby responded, thanking all for their kindness.

The list of Mayors for the new municipal year contains a larger number than usual of names of gentlemen associated with gas or water supply. Beginning with the Metropolitan Boroughs, Mr. Alexander Dickson, the Mayor of Deptford, is Chairman of the Bromley Gas Company and a Director of the Kent Water Company; while Alderman Harben, who succeeds Sir John Aird in Paddington, is son of Sir Henry Harben, a Director of the New River Company. In the Provinces, Mr. J. Halliwell Rogers, the Lord Mayor of Birmingham, was Chairman of the Gas Commitee during the past municipal year—taking the position vacated by Alderman Lloyd on becoming Lord Mayor; and he is upon the Water Committee. Alderman W. Emslie Raley, the Mayor of Barnsley, has been Chairman of the Water Committee for the past ten years. The burgesses of Bolton have shown their continued confidence in Alderman Miles by re-electing him. Alderman W. E. Pease, the Mayor of Darlington, is a Director of the Weardale and Shildon Water Company. Alderman Charles Tacon, the Mayor of Eye for the eighth time, is Chairman of the Gas Company. Alderman Josiah Wade, the Mayor of Halifax, has been Chairman of the Water Committee since 1897. Alderman Monkhouse, who has succeeded Mr. G. Gilkes at Kendal, is Chairman of the Gas, Water, and Electricity Committee of the Corporation. Alderman E. Finn, who has been elected Mayor of Lydd for the fifteenth time, is Chairman of the Gas Company. The successor to Alderman Newton, as Mayor of Newcastle-on-Tyne, is Alderman Sir W. H. Stephenson, Chairman of the Newcastle-on-Tyne and Gateshead Gas Company. Alderman Matthew Walker, the new Mayor of Pudsey, was for two years Chairman of the old Local Board. It was during his term of office that the water-works were purchased from the Calverley District Water Company; and he conducted the negotiations for Pudsey. He afterwards served for three years on the Leeds Corporation, and for five years he was an Alderman of the borough. During this period, he was Vice-Chairman of the Gas Committee and Chairman of the Meter and Mains Committee. Alderman Lister, the new Mayor of Stockport, is Vice-Chairman of the Gas Committee in that town. The Mayor of Torrington, Major H. L. Mallet, is Chairman of the Gas Company, and this is the third year of his election to the mayoralty. Alderman E. A. Brotherton, who has been chosen to fill the mayoral office at Wakefield, is well known to our readers from his connection with the chemical manufacturing company who carry on the extensive business with which his name is associated. He represents the borough in Parliament.

The Amalgamation of the Institute and Institution.—As mentioned in the "Journal" last week, the confirmatory meetings of members of the above-named Societies will be held on Saturday, the 29th inst. They will take place in the hall of the Society of Arts—that of the Institute at twelve, and the other half an hour later. The resolutions to be submitted will provide for winding up the Institutions, and the nomination of Liquidators.

The Southern Association Naphthalene Discussion.—Mr. H. E. Jones writes that, in reporting his opening remarks at the meeting of the Southern Association, the word "not" has been imported. "What I said was: 'If I can tell of a works on a considerable scale.'" The "not" appears clearly in the shorthand notes, and its elimination, it seems to us, would materially affect the construction of the context. However, Mr. Jones in his note adds: "*Re* Mr. Prentice's difficulty as to CS_2 when using benzol, I had exactly the experience Mr. Glover gave, that the benzol had to be freed from it."

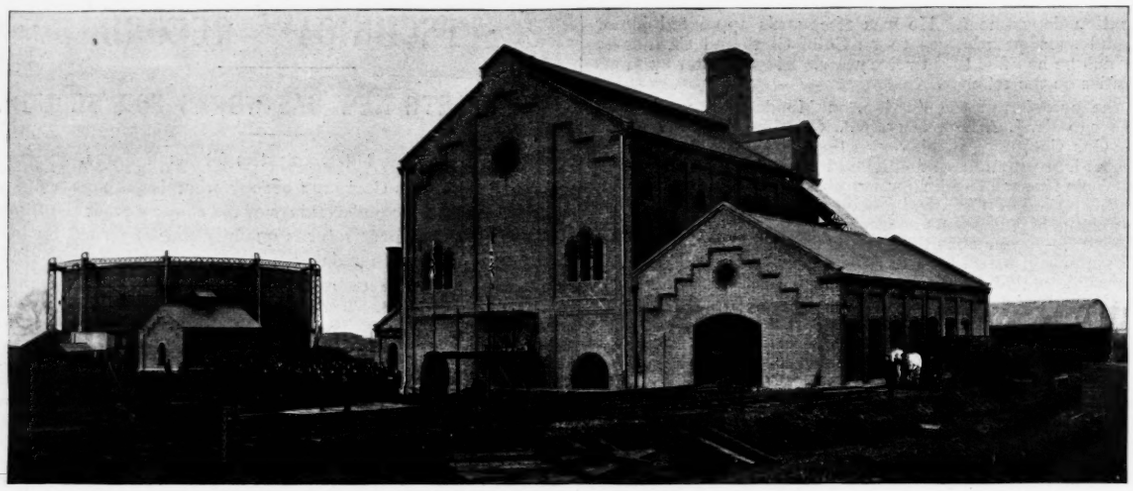
TECHNICAL RECORD.

A COMPLETE NEW GAS-WORKS FOR SLOUGH.

The Inclined Retort System for Small Works.

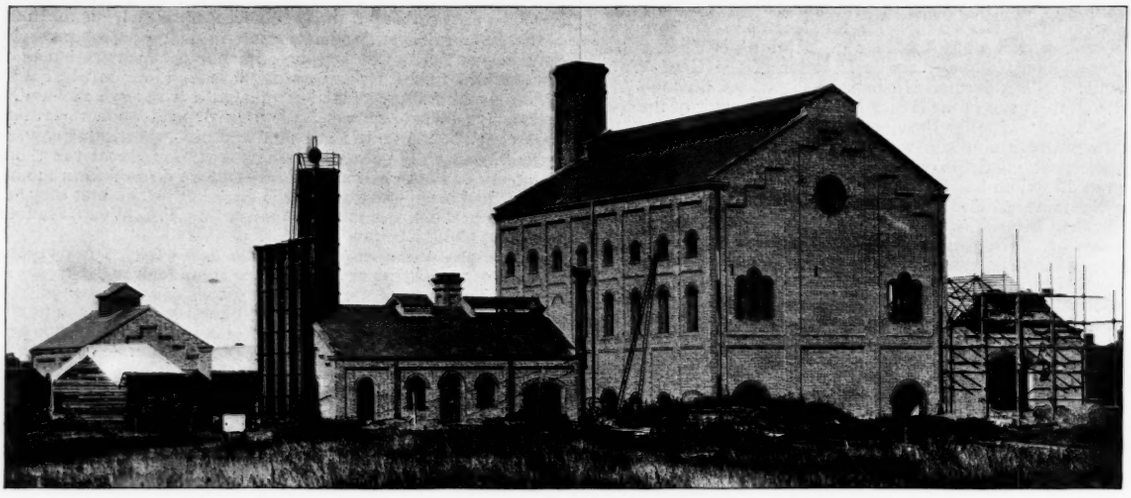
The Slough Gas Company occupy what is perhaps a unique position among gas undertakings of the country other than those (as the Board of Trade returns quaintly put it) owned by local authorities. Last Thursday, amid the congratulations of a host of friends and gas engineers from the Midlands and through the country to the far south-west and south-east, they inaugurated a complete new gas-works, and what is more a works that will depend solely upon the inclined system of carbonization. Gas produced in horizontal retorts will not traverse the distribution system of the Company again for many a long day; and it may be—in fact, it is more likely than not—never will again. We know of no company in this country with as small an annual output as that of Slough—some 45 million cubic feet—who have committed themselves entirely to the inclined system in this way. The Harrow Gas Company have an installation of smaller daily output; but that Company have still, we believe, their horizontal retorts and moreover a water-gas plant. At St. Albans there is also a smaller installation; but, again, so far as our knowledge goes, they are not dependent solely upon their inclined settings. Therefore, Slough, among the smaller gas companies, lead the way in putting entire confidence in this system; and, consequently, the working of Slough will certainly be scrutinized very carefully, and with the greatest interest, by the gas engineers of the country. The proof of the system, and of its self-sufficiency from the economical and other points of view, for a gas undertaking of the size, now rests largely in the hands of the Slough Company; and success in their case, the prediction may be ventured, will largely influence the penetration of the system into that (in point of magnitude) lower level of works whose maximum day's make is met, with a reserve in hand, by four or five beds of retorts. We may depend upon this, that if good construction on the one hand and perseverance, energy, and watchfulness on the other will show that the faith of the Slough Company has not been misplaced—and we do not for a moment think it has been—then success is assured; for the first they have already obtained, and in the Engineer (Mr. T. C. Webb) are found the other three specified qualities.

Before proceeding to describe the new works, a few explanatory notes are necessary. It is now some four or five years ago that the Directors of the Company recognized that the old works were fast reaching their limits of production; and an inspection of those works last Thursday was convincing that, from other points of view, too, it was full time that a complete change was made. Cramped in situation, packed to the point of inconvenience, and with plant that had done a good life's work, the best and most economical operation could not possibly be secured; and, therefore—successful though the Company had been in their enterprise from the shareholders' point of view—such conditions as time had brought about, if continued, were sufficient to threaten their future interests. But the Slough Directors, under sound advice, wisely determined to do the one thing needful, and that was to construct for themselves complete new works elsewhere, and start on a fresh career under the influence of the most modern practice in gas manufacture, and to close down for good and aye the old works that had served their purposes and those of the consumers up to the present. The fresh chapter in their history may be said to have opened with the inauguration of the new works on Thursday. At the time to which reference has been made, the Company purchased a piece of land for the works of about 4 acres in extent. It is admirably situated for the purpose—in level, in position in relation to the town, and in its proximity to the Great Western Railway and the canal, to which the Company have a private road and wharfage facilities. It may be mentioned that negotiations are pending between the Company and the Great Western Company for a siding direct from the main line; but the former already have the right to use a branch which passes through adjoining property, and to this line the new works are connected for the present. But that by the way. Additional storage being required in 1889, a gasholder in steel tank was erected on the newly-acquired site; and thereafter consideration was given to the question of the new works, and Mr. Webb—encouraged by the enterprise and confidence of the Board—proceeded to lay his plans for them. The result, as seen to-day, is, as one prominent Engineer expressed it at Thursday's inauguration, "a monument" to his skill as a designer. The works are well disposed on the land; there is freedom for the carrying on of the operations everywhere, and with the minimum of labour; there is a large piece of totally unoccupied land left between the railway and the present buildings for future extensions; the buildings (which are of yellow brick, with blue brick quoins and arches, and slated) are of solid structure without elaboration; and the plant generally is so arranged and of a character that impresses one with its ability to render a good account of itself in the future. In short, the general view of the engineers who were present at the inauguration last week is that, for the £15,000 or so that has been spent on



THE NEW RETORT-HOUSE, WITH COAL-STORES IN FRONT.

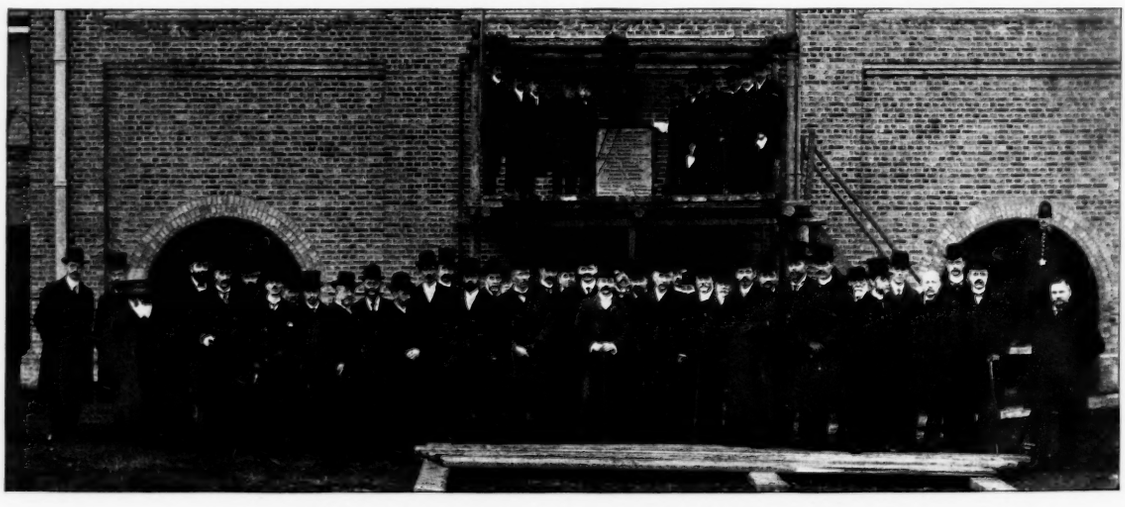
the new plant and buildings (exclusive of the gasholder), the Company have secured remarkably cheap works, which testifies to the care with which the Engineer developed his scheme. Here it may be said that the contract for the entire works (including all buildings and ironwork) was secured, in competition with other firms, by Messrs. R. & J. Dempster, Limited, of Manchester; and they have fully justified the action of the Directors in entrusting to one firm the execution of the whole project. In the construction of modern works, this again is almost unique. Upon Mr. Charles Dempster, son of Mr. John Dempster, of



A GENERAL VIEW FROM THE REAR.

Manchester, fell the responsibility of supervising the work on behalf of the contractors; and the manner in which he has acquitted himself of the task shows that, in his hands, the reputation of the firm has been upheld—both in regard to time (the contract was only placed at the end of last year) and workmanship.

Now, in describing the new works, the retort-house must first be taken, as being the central feature of interest. The dimensions of the building are 70 ft. long by 52 ft. wide and about 44 ft. high, with an iron roof and slated. It contains a bench of six arches, four of which are at present filled with six retorts



AT THE INAUGURATION OF THE SLOUGH GAS-WORKS.

THE INTERIOR OF THE RETORT-HOUSE DURING THE CONSTRUCTION OF THE SETTINGS.

(The Stage Floor is being left as shown in the Photograph until the Settings are filled in.)

21 in. by 16 in. at the upper end, and widening out to 23 in. by 16 in. at the discharging mouthpiece. They measure 16 feet long on the slope, and are built with regenerative furnaces. It should be stated that the settings and chimney were erected for Messrs. Dempster by the Winstanley Speciality Company; and the bare mention of this fact is sufficient to acquaint gas engineers of the type of the settings and of the excellence of the work put into them. The length of the retorts—16 feet—is a feature of the installation, seeing that the tendency now is to put in inclines of greater length than formerly; and it is interesting to have from Mr. Webb the reasons that induced him to adopt the shorter length. He states that this shorter length was decided upon after many visits to works having inclines, and using North of England coal. He contends that certain Durham coals creep if a charge is laid 20 feet long, even if the angle of the retorts is as low as 30°. If, however, the retorts are set at an angle of 32°, and the charge is only 16 feet long, the coals are strong enough during carbonization to withstand the tendency to slide. Information as to Mr. Webb's future experience in this matter will be of value to the gas industry. Of course, it is also clear that, for a small works, relying entirely upon inclines, beds of 20-feet retorts would constitute rather large units.

But leaving the retorts, it is noticed, among many other points, that the charging and discharging floors are covered with iron plates; and along the wall of the upper floor, the plates are perforated to assist ventilation. In the lower floor opposite the retorts are openings, underneath which coke-shoots are fixed, so that the hot coke is delivered direct into barrows; and, if required hereafter, a hot-coke conveyor may be substituted for the coke-shoots. The settings are very heavily stayed for such a small size; the uprights being 16 in. by 6 in. steel joists, and all the furnace bracings, back and front, together with the mouthpiece stays, are of joist-iron. The buckstays carry the floor-girders, and are extended on the charging side so as to support the coal-hopper joists and water-supply tank. The coal-hoppers are continuous, and have a storage capacity for about 36 hours, with a central opening at the foot of the sloping bottom opposite the centre of each bed of retorts. There are three separate chargers of the Shoubridge travelling type, which may be regulated from 3 to 6 cwt.; and it was seen that the machines are easily manipulated by one man. The upper mouthpieces are reduced at the front edge to 21 in. by 10 in.; and this materially reduces the weight without at all interfering with the working. The ascension, bridge, and dip pipes are 7 inches in diameter throughout; and all the hydraulics, tar, and gas mains are supported upon the bench bracing.

During Thursday's inspection, the retorts were working admirably. The charges were going in evenly, and the spent charges were being emitted cleanly, without the slightest probing. At the present time, only three of the four beds are in use; and, of course, it will depend upon the progress of the Company's business when the remaining two beds are filled in. The annual output is about 45 millions per annum; and the consumption just now is equal to 180,000 cubic feet per day. Working with 5 cwt. charges, the make of the retorts on Thursday was at the rate of 12,000 cubic feet per day each, though it was mentioned that they are capable of producing more. At the time, the three beds had been at work about four weeks; and the total output had been 4 million cubic feet.

Regarding other portions of the bench fittings, it was seen that the tar-pipes are taken from each hydraulic, and coupled direct to a tar-receiving box at the end of the bench, and all the dip-pipes are controlled by the overflow from this box. This method assures the tar leaving the hydraulics directly it is formed; and it sinks to the bottom of the receiving-box to be drawn off as it accumulates—thus insuring the hydraulic mains only containing liquor, while each main has a direct water supply for flushing purposes. The gas is taken off from the top of each hydraulic main, into a 15-inch diameter steel main carried round the inside of the house. To this method of dealing with the tar, Mr. Webb attributes the absence of stopped pipes.

Running parallel with the retort-house is the coal-store, which is 70 ft. long by 34 ft. wide by 23 ft. high, with iron roof and slated. The floor of this building has been fixed 4 feet below the retort-house, to allow of the coal falling from the elevated railway, so as to save the cost of stacking, and at one end of the store a shoot leads into the coal-breaker hopper. The coal is brought from the siding over a truck weighbridge, and may then either be taken direct to the coal and cannel breaker or to the coal-store. The hopper over the breaker is of sufficient size to take a truck of coal. At the bottom is a regulating feed-door, which is operated from the ground level. The breaker is fitted with a top and bottom set of claws for reducing the large lumps to the proper size. A truck of coal was being discharged into the hopper on Thursday; but the work was being done by hand through the side doors. This necessarily entails considerable labour; but Mr. Webb gave the information that a change is contemplated in this respect by the provision of some arrangement

for the up-ending of the trucks, and so rapidly discharging them. Another improvement that is to be made is the construction of a roof of a span sufficient to completely cover the trucks and the hopper, which are at the present time exposed to rain, with the result that the water collects in the breaker-pit.

A tormenting amount of difficulty was experienced in the construction of this breaker-pit. As will have been gathered, it is considerably below the ground level—in fact, the Contractors had to excavate to a depth of 26 feet to form the pit and the engine-house. But at 4 feet below the surface, water was encountered. A powerful centrifugal pump, working night and day to keep the water out, and very careful strutting and working were needed so as not to jeopardize the adjoining buildings. This pump, even in the very wet summer experienced, drained the water from wells two miles away; and yet when the tar and liquor tanks were commenced, within 50 yards of the breaker-pit, similar pumping tackle had to be fixed to keep the water out of the excavation.

The elevator (which is capable of easily dealing with 20 tons per hour) delivers the coal on to a horizontal push-plate conveyor fixed above the coal-hoppers; and all is prepared for future extension when required. The coal plant is driven by a vertical steam-engine, directly coupled up to the main driving shaft of the breaker. The supply of the coal-handling plant was entrusted by the Contractors to the West Gas Improvement Company, Limited.

The boiler, exhauster, pump-houses, and workshop (all of which are admirably fitted and finished for their purpose) are comprised in a separate block of buildings near by. Two Cornish boilers, each 16 ft. long by 5 ft. 6 in. diameter, are fitted with patent furnaces; and duplicate feed-pumps are provided. A convenient doorway from the retort-house admits of easy supervision by the stoker or fireman. Two 20,000 cubic feet per hour combined engines and exhausters are in position, together with the requisite governors and regulators; all being finished in a highly creditable manner. The engine-room has been well designed and neatly finished. It is not overcrowded with other apparatus, so that the exhausters can be readily kept clean and bright, which is often a neglected point in small works. Excepting the boiler-feed, all the remaining pumps are fixed in one special building, which enables the easy inspection and keeping in good order of the plant.

The condensers are of the annular type, consisting of four vertical steel columns, 32 feet high and about 4 feet diameter. The scrubber is 50 feet high by 8 feet diameter, filled with boards, and fitted with a liquor-distributor. Preparation has also been made for a washer to be removed from the existing works, which will act as a finishing vessel, and be supplied with clean water.

Four purifiers, fixed in line, are constructed on what is known as the Green or dry-lute principle. Each measures 18 feet square by 5 feet deep; and the whole are sunk into the ground to within 18 inches of the top. Three are worked by means of a Dempster improved dry-faced centre-valve, and are charged with oxide, and the fourth is worked as a catch-box with lime. Provision has been made for a fifth box when required. The covers are of large size; the opening being about 16 feet square; so that, when the covers are removed, the facilities for filling and discharging are equal to the water-sealed type. (Incidentally, it may be mentioned that, at the dinner in the evening, the interesting statement was made that at the Eton Gas-Works, which are only about two miles away, the late Mr. Venner constructed rubber-jointed purifier covers upwards of 25 years ago, and one of these may still be seen in work.) A curved roof covers the purifiers and the lime house, which is situated at one end; while there is space for the revivification of oxide adjacent to the oxide purifiers. A 20,000 cubic feet per hour Parkinson and Cowan station meter and a 12-inch diameter Cowan station governor are fixed in a separate well-finished building; and another convenient house (situated a little distance away and adjoining the railway), which is to be used as an office, contains the weighbridge beam.

Among sundry matters may be mentioned that all the tar and liquor pipes on the works are coupled to an underground tar and liquor separator, and thence pass into tar and liquor tanks respectively 21 ft. and 26 ft. 6 in. by 9 ft. deep. A well has been sunk on the premises, and the water (which is pumped into an overhead supply tank) is suitable for all purposes. It is the intention to build a residence for the Manager at one end of the site; while space is reserved for a sulphate plant. The gasholder on the works (which was not part of the present contract), is of the ordinary type, having lattice standards and girders, and is contained in a steel tank. It has a capacity of 100,000 cubic feet, and is prepared for telescoping. The gasholders at the old works all gave a greater pressure than the new one; so that it was necessary temporarily to weight and limit the working range of this holder, so as to operate it without supervision. It will now be necessary to reverse this arrangement; for, until additional storage is provided, the old gasholders will be utilized.

This description of these interesting model works may be concluded with the statement that at the present time they have a capacity of 400,000 cubic feet per day, which may be doubled in future at a very moderate outlay.

At the close of the inspection on Thursday, the Chairman of the Company (Mr. Richard Martin) fixed a large stone tablet in the exterior of one of the end walls of the retort-house. Before performing this very pleasant little task, Mr. Charles Dempster presented the Chairman, on behalf of Messrs. R. & J. Dempster, with a handsome silver trowel, beautifully engraved. In the course of a few neat accompanying words, Mr. Dempster sincerely expressed the hope that Mr. Martin would live many years to grace the chair which he had so ably occupied for a great number of years. In his acknowledgment, Mr. Martin said he could not really express his pleasure at receiving such a handsome trowel. He added that during the time Messrs. R. & J. Dempster had been engaged on the works, they had given the Directors the greatest satisfaction. The firm and the Engineer had worked together amicably; and he had never heard a single thing but good of the Contractors. In a workmanlike manner, the Chairman applied a bed of cement; and the stone was lowered into position, amid the cheers of the spectators. The tablet, which states the time and occasion of the laying of the stone, also imparts the information that Mr. Martin has been Chairman of the Company for upwards of 25 years; and further inscribed on it are the names of the Deputy-Chairman (Mr. Edward Herbert), and the five other Directors. Then follows the name of the Engineer and Manager, and that of the Secretary (Mr. Arthur Thomas), as well as of the Contractors.

In the evening there was an inauguration dinner at the Royal Hotel, at which there were a considerable number of guests. The Deputy-Chairman relieved Mr. Martin of the duties of the chair. Toasts, suitable to the occasion, were interspersed between the courses of the dinner; this departure from the ordinary rule being due to the fact that most of the visitors had railway journeys before them. The speeches were highly complimentary to the Company, to the Secretary, the Engineer, and the Contractors and their representatives on the work (Mr. Charles Dempster and Mr. Scott). In the course of his speech, which contained several of the points incorporated in the foregoing description of the new works, Mr. Dempster paid a high compliment to the Sub-Contractors—the Winstanley Speciality Company, the West Gas Improvement Company, and Mr. Bowyer, to whom the building work was confided. To the chorus of congratulations on the successful completion and starting of the works and upon their general character, we may heartily add ours, together with the best wishes for their prosperity.

CARE AND MAINTENANCE OF INCANDESCENT GAS-BURNERS.

By MacDougald Dexter, of Columbus, Ga.

[A Paper read before the American Gaslight Association.]

The incandescent gas-burner has now been in general use some eight or nine years; and very probably the future of the gas-lighting industry is to be by means of these burners. There has been little change in the present burners, either in the direction of mantles of stronger material or of burners that require any less expert and careful attention for their adjustment and maintenance. The tendency of improved burners seems rather to be in the direction of principles more complicated.

It may be stated as an axiom that the greater the complexity of an appliance, the greater the need of expert supervision. On this ground alone, gas companies should undertake the maintenance of incandescent gas-burners. It is a part of their business, in these days of competition, to see that their product appears to the best advantage. It is the gas companies' product that is condemned when the burners are not up to the proper standard, or when they are a source of annoyance to the consumer. Do not consumers prefer to be relieved of bother with the burners, even if they could be taught how to adjust them? Have you not furnished them with burner saws, and seen how many neglect this simple attention?

Oil-lamps owe their use partly to the fact that they require little equipment—namely, the lamps and oil-can—and partly to their economy, because lights of low candle power are sufficient when they are portable and can be placed where required. They need some labour to keep them trimmed and filled. But this is simple, and can be attended to by a servant; and furthermore it is known at what intervals this attention is required.

The chief advantage of incandescent electric lighting is, of course, its convenience. Although it be expensive, the consumer pays largely for being relieved of bother. The renewals are easily put on by anyone, and they require no regulating or adjusting. The maintenance of electric arc lights, on the contrary, requires expert attention, and is, of course, looked after by the electric company's trimmers on their regular rounds. They supply the renewals, keep them adjusted, and also keep the glassware neat and clean. The popularity of arc lights is largely due to regular inspection and to the consumer being relieved of all care.

In dealing with the incandescent gas-burner, we offer a light of high candle power, a steady light, and a very economical light, but one that, because of the delicacy of the mantle, requires careful attention and renewals at indefinite and unexpected intervals. It is this indefiniteness that tends to annoy the consumer. With gas consumers in general, the influence of expectation should not be lost sight of. It is the unexpected bill that so

irritates. The bill the amount of which is foreknown is one that is paid with the least complaint. This is the cause of many preferring to pay a "flat rate" the year round rather than often a less amount in unexpected and indefinite amounts. While paying a bill for renewals a little larger than usual, they estimate the cost nearer this amount than the average of what they do pay.

I do not, on these grounds, advocate selling gas at contract or flat rates. In the absence of safeguards that electricity possesses, too great a margin has, in the case of gas, to be left for the unnecessary use which invariably occurs when a consumer considers that he pays to use it, and wants to get his money's worth. But we do advocate a contract system for the furnishing of the attention and renewals required by incandescent burners. Supplying gas by meter tends to make the consumer careful; the amount used being dependent on his care. On the other hand, the amount of renewals is not exactly under his control. The fragility of mantles is now pretty well known; and as breakage is the source of more or less inconvenience, the consumer is careful with them. The breakage that occurs is principally due to natural causes. With flat rates for renewals, the consumer is insured against unexpected expense and the gas company against unreasonable complaint.

We have had for several years in Columbus, Ga., in connection with our contract maintenance, a system of inspection whereby visits are made once a week, the renewals supplied, and necessary adjustments made. If we wait for consumers to make complaint of breakage, most of them are made as darkness approaches, and especially at lighting time. Very often the consumer is not reminded of his need until he has use again for the light; and at this time he wants it fixed promptly, for, if a store or office, it is a busy time. A great many single trips have to be made, and, in the case of residences, long trips. With this inspection system, we have found that the congestion of complaints is very much reduced. Fewer men are required; they therefore become more expert. Most of the renewals are made by the inspectors when the store or office is not so busy or the light is not immediately required. They can therefore be adjusted with more care. The consumer is not required to make as many complaints; therefore he does not exaggerate the nuisance of breakage.

It might be argued that, as a certain amount of breakage occurs each day, an inspection once a week will only lessen the calls sent to the office for special trips by one-sixth. But the proverbial stitch in time should not be forgotten. It is a fact that a complaint is not made until the chimney or mantle is gone, or the lights badly in need of attention. The inspection system tends to keep the lights in good adjustment. The mantles are renewed when required, very often saving the chimney and another complaint.

With the inspection, we include the supplying of clean chimneys in place of those badly soiled. We have found that there is a general prejudice among consumers against washing chimneys on account of breakage, and a general disinclination to handle such delicate appliances. Almost all breakage of chimneys or other glassware is caused by a jet of flame through a hole in the mantle heating the glass unevenly—thus disannealing it. This is the cause of the damage, and washing only causes the breakage to occur a few days earlier, or it may not happen until it is put on another burner.

Gas arc lights were designed to compete with the electric arcs; and their success is largely due to the fact that they are usually inspected, cleaned, and maintained by the gas companies and at a fixed charge per month. The method of installing them, whether they be rented or sold, and the charges for rent and inspection and maintenance, are matters that are dependent in different localities upon the sharpness of competition. In comparison with the electric arc, either plain or enclosed, the gas arcs are as ornamental, or even more so, considering the agreeable colour of the light and its greater diffusive power. The light is steadier, and there is not the disagreeable hum of the enclosed arc. They cost less to instal, and require less maintenance attention.

It has been found that the cost of renewals and attention is less for gas arcs than for separate burners. Fewer mantles are required, since one with a small break is still serviceable, and has not to be renewed on account of danger to a chimney or small globe. The glassware not being highly heated, is easily kept clean. A man in position to adjust one, inspects four or more burners without having to move his ladder, thus saving considerable time.

It is known that the most efficient burner is the one that has the best mixture of gas and air. Since we have a rather limited gas pressure, it is necessary to have the maximum pressure possible at the bunsen check. It would seem that smaller pipe than was necessary with flat-flame burners would easily supply incandescent burners, since they consume only half the gas. With a number of plain burners lighted, the pressure at the tips is reduced, and also the size of the flames. The flame is, however, of the same intensity, and the reduction in the amount of light is hardly noticeable. But with incandescent gas lighting, while the flame is reduced by insufficient pressure, the size of the mantle remains the same, and it is rendered only partly incandescent. Consequently, insufficiency of supply or pressure is the more noticeable.

It is a good idea, when making a renewal, to see that the flame is of the proper height and intensity. If not, the check should be cleaned of dust or other matter that would obstruct the amount or velocity of the gas. An obstructed gauze causes back pressure and insufficient air to be drawn in. Simply blowing through the gauze is sufficient to remove obstruction such as dust; but if corroded or burned, it should be renewed. Dust, insects, or, in barbers' shops, particles of hair are drawn in through the mixer. Part lodges on the gauze, and part falls back on the check. This obstruction considerably reduces the efficiency of the burner, and has frequently to be removed, depending upon the amount the burner is used and its construction. Burners with meshes or sieves for the intimate mixture of gas and air are liable to lose rapidly in efficiency from obstructions of this nature.

It is important that outside lanterns be so constructed as to readily remove the products of combustion and not cause back-pressure. There are few lanterns for clusters that do this.

A new cap and gauze are hardly necessary with each new mantle. Then to those who undertake maintenance, a loop mantle is preferable, apart from its cheapness, for the following reasons: It is easily removed for clearing the gauze of obstruction; and it can be burned off before placing over the cap, as a great part of the breakage of mantles during burning off, or the first night or so of use, is caused by the skirt of the mantle being imperfectly burned off and sticking to the cap. The expansion or contraction of the mantle then causes a fracture.

Manufacturers have it in their power to greatly assist those who have adopted the maintenance system, and the "Why nots?" that follow are more particularly addressed to them.

1.—Bye-passes. The side tube bye-pass has the advantage over others in that the main gas supply is not reduced; and it is the most economical in gas consumption, since the mantle is in contact with the pilot flame, and tends to keep it lighted. This spark of light enables one to find the burner on entering a dark room or hall. The objections to this form of bye-pass are that it is unhandy to place the gallery on, so that the side tube goes under the skirt of the mantle, and that a movement of the gallery round causes the side tube to alter its position and break the mantle. Why not bind the side tube in position by passing it through a lug similar to that for holding the mantle wire? The ground joint near the base of the side tube will enable the gallery to be placed on and off with ease.

2.—The fact that a gallery can be lifted off is convenient, for the inspector has only to procure a step high enough to enable him to reach it. But for cleaning a check, the bunsen has to be screwed off and blown through, or else the inspector has to be high enough to see the check-holes to clear them with a pin. In this connection, I would say that the check with a single orifice at the apex of a cone has the advantage that dust does not settle over the orifice, and the single orifice is not so easily obstructed as the smaller ones. Why not a burner that could be removed, check and all, as easily as the gallery is now, or as was the tip in the old plain burner? Such a burner could be removed, another substituted, and the damaged burner brought to the office for thorough inspection and adjustment. It would be especially serviceable in exposed places where the handling of mantles is attended with risk.

3.—Chimneys tend to become disannealed from the fact that they are unevenly heated; the impact of the air keeping the bottom of the chimneys comparatively cool. Why not a burner that would place the whole chimney within the hot zone? Where the chimney is frosted or etched, there is little need for glass. With such an arrangement, a shorter and therefore less expensive chimney could be used.

Although great developments may be expected in incandescent gas lighting, it is my belief that even with our present appliances we can hold our own in the lighting business, provided the burners are properly maintained. Whose business it is to see that they are so maintained, does not admit of much question.

Petroleum Discovery on the Turco-Persian Frontier.—The Bombay correspondent of the "Journal des Débats" refers to the reported discovery of immense deposits of naphtha in the region which extends from Kasri-Cherin, in the province of Ardilan, to Kerkouk in Mesopotamia, and which are shortly to be exploited by Mr. Darcey, an English capitalist. It is said that with this object in view he proceeded to Teheran some time ago, and obtained from the Government of the Shah, by paying £20,000 and with the support of the British Minister, a concession to work all the petroleum-bearing lands in Persian Kurdistan. Since then, Mr. Darcey is reported to have succeeded in forming a Syndicate, and works have been undertaken with the object of establishing a system of pipe-lines to drain the oil from Kasri-Cherin to Mohammerah, where the oil would be loaded into tank vessels. The correspondent remarks that if the Syndicate are able to lay down the proposed pipe-lines, they will realize profits, of which the natives would perhaps derive some advantage; and, in any case, it would compel the oil producers of Baku to abandon the markets in the Persian Gulf. But the turbulent natives who occupy the region in question would, sooner or later, yield to the temptation to destroy the pipes laid by the "infidels," or seek to draw off the oil from them. In order to protect their property against such depredations, the Syndicate would have to employ an army of guards over a distance of several hundred miles; and the correspondent concludes that these difficulties reduce to modest proportions the chances of success in obtaining the concession.

COAL UNLOADING AND CONVEYING PLANT AT THE NANCY GAS-WORKS.

Nancy is the principal town in French Lorraine, and has a population of about 100,000. It is an industrial centre, and has risen to great prosperity since the time of the Franco-German war—its population has nearly doubled in the interim, owing mainly to migrations from the adjacent districts which were made over to the German Empire when peace was declared.

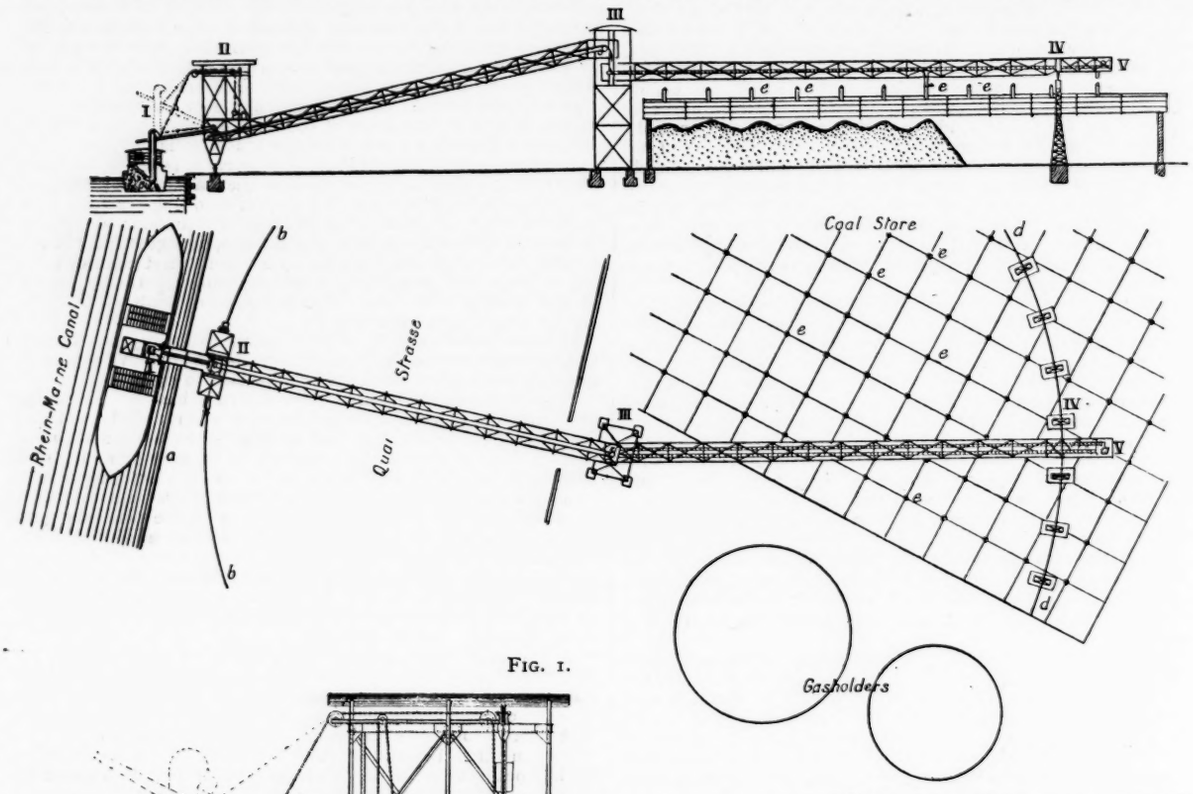


FIG. 1.

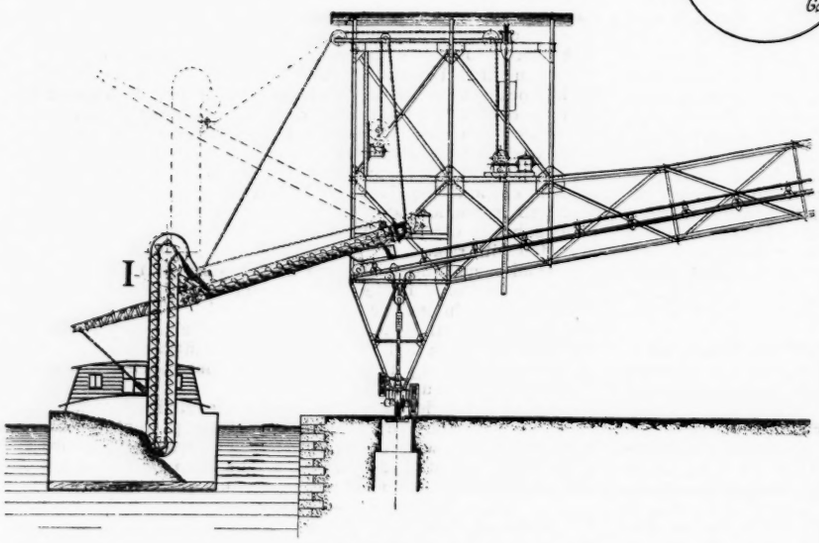


FIG. 2.

The gas-works have consequently also had to be enlarged several times, to keep pace with the growth of the place. The establishment of electricity works checked for a time the rapid increase in the demand for gas, but caused no permanent falling off in the prosperity of the gas undertaking.

The coal for gas making is obtained from the Saar field and the Belgian frontier; and, thanks to the fine system of canals existing in France, it can be brought to Nancy most cheaply by water. The gas-works were consequently long ago built close to a quay on the Rhine-Marne Canal, which naturally runs through the low-lying parts of the town. The position is therefore a very suitable one. Moreover, the canals in France are free from ice nearly all the year; the stoppage of navigation on the Rhine-Marne Canal extends on the average only for some forty days a year. Thus

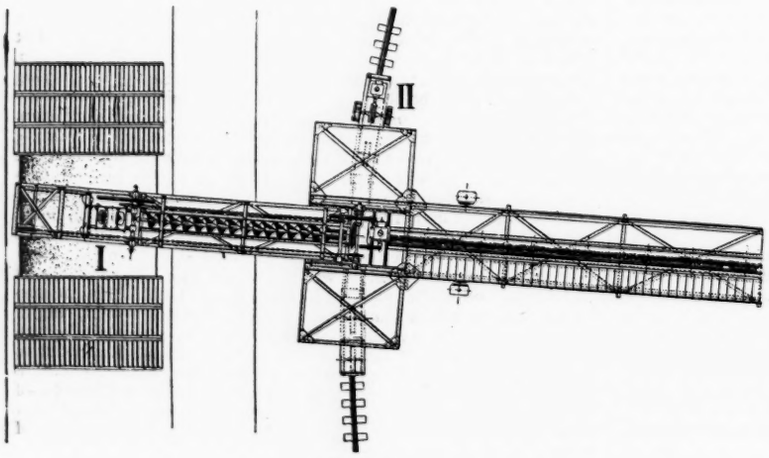


FIG. 3.

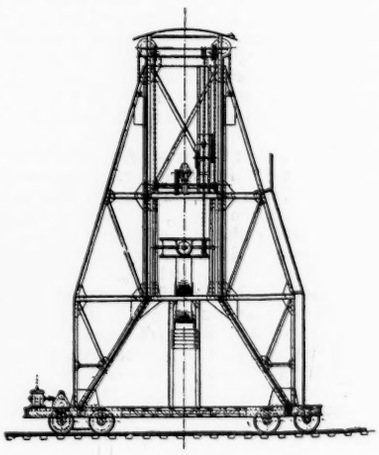


FIG. 4.

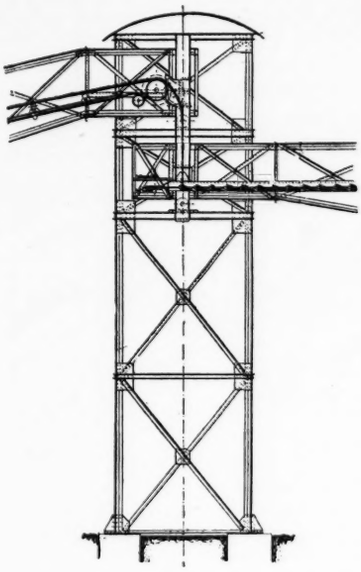


FIG. 5.

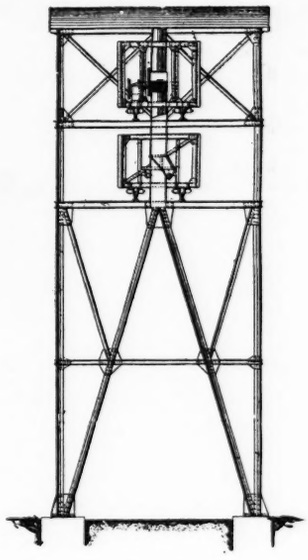


FIG. 6.

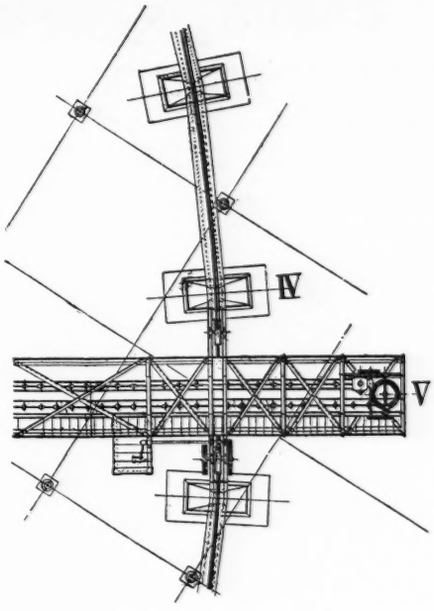


FIG. 10.

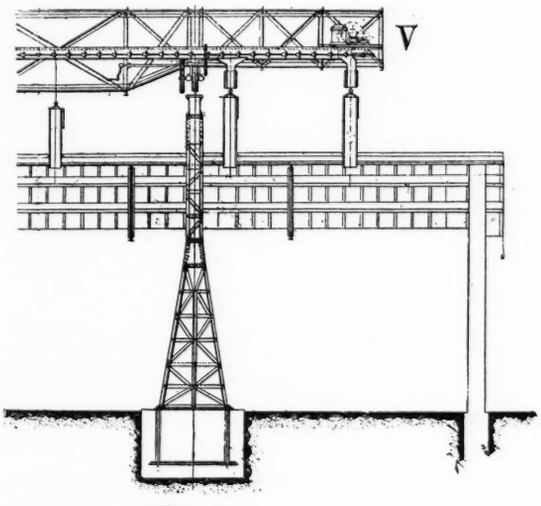


FIG. 8.

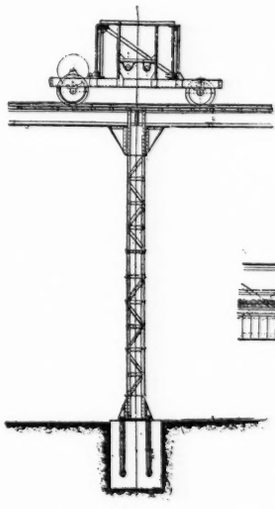


FIG. 9.

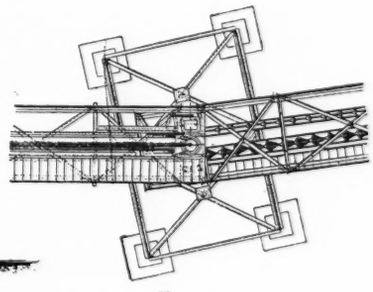


FIG. 7.

there is no necessity, on this account, to lay in a large store of coal; but the frequent occurrence of strikes in the coal districts during recent years points to the wisdom of keeping a good stock on the works.

The old method of unloading the cargoes by hand became less and less satisfactory as the quantities to be dealt with increased; and the rates of pay of workmen continually went up. Hence the authorities of the works decided, notwithstanding the considerable outlay entailed, to put in unloading and conveying machinery of the latest pattern, driven by electrical power. The installation was carried out jointly by the firms of G. Mourraille and A. Michelin, both of Paris; and as it embodies many interesting details, we give below some particulars taken from a description by M. Keppler, which has been published, with the illustrations here reproduced on a somewhat smaller scale, in a recent number of the "Journal für Gasbeleuchtung."

Though the site of the gas-works is so favourably situated on the quay street of the canal wharf, it is hemmed in on the one side by the site of an abattoir, and on the other by the Rue du Faubourg St. Georges. Consequently, it was essential that the available space should be utilized to the very best advantage. It will be seen from the illustration (fig. 1), which shows the general scheme of the plant, as well as from the plans of various portions which follow, that at the point II. on the bank of the canal there is a pier, which travels on the single-rail track *b b*. This pier carries on the outside an elevator 33 feet in length, which can be drawn up, and comprises a horizontal or inclined screw conveyor and a vertical bucket elevator. On the inside, towards the works, is a bridge 50 feet in length, connecting the travelling pier with the fixed pier III., and rising at an angle of 18° in the direction of the latter. This bridge carries an endless conveying band.

The moveable bucket-elevating apparatus (figs. 1 to 3) raises the coal vertically from the ship's hold, and discharges it on to the endless screw I.—II., which terminates at the pier II., at a height of about 16 ft. 6 in. above the quay wall (fig. 2). The coal is then taken up by the endless conveying band II.—III. (fig. 1), and carried overhead across the quay street to the pier III. (figs. 5 to 7) within the works. It reaches this pier at a height of about 42 ft. 6 in. from the ground level. In order that a longer stretch of foreshore may be accessible with the elevator, the whole of the structure indicated by I., II., and III. is made so that it may be moved about a pivot on the fixed pier III., by means of a carriage with two wheels travelling on a single-rail track *b b* (figs. 1 and 5).

The coal-store to be filled extends to the left of the projection of the line I.—II.—III., while the large gasholders are to the right of it. Over the roofs of the coal-store, there is a horizontal travelling bridge, III.—IV.—V., 184 feet long, extending from pier III., on which it is pivoted. It travels, by means of rollers at IV., on a single-rail track *d d*, supported by fixed piers (figs. 1, 8, and 10). This bridge, which is 30 ft. 6 in. above the yard level of the works, carries a horizontal chain conveyor, and, through its moving horizontally, passes over the whole of the roofs of the underlying coal-shed.

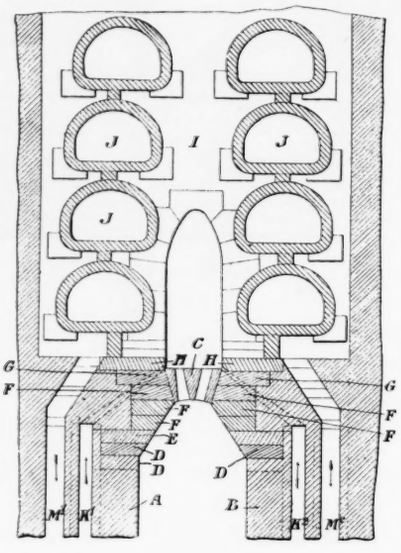
Openings (*e*) for shooting in the coal are provided at suitable distances apart in the specially shaped roofs of these sheds (figs. 8 and 9), and these openings are connected, by means of moveable troughs, with corresponding places in the chain conveyor. The coal-sheds may be thus perfectly uniformly filled by purely mechanical means, and with freedom from any manual labour, in the shortest possible time. Both the contracting firms have guaranteed that the installation will be able to convey 30 tons of coal per hour, and that the machinery will require the attendance of only one fitter, and one experienced hand. Four day labourers will at the same time be wanted in the barge to break up the coal and bring it up to the elevator.

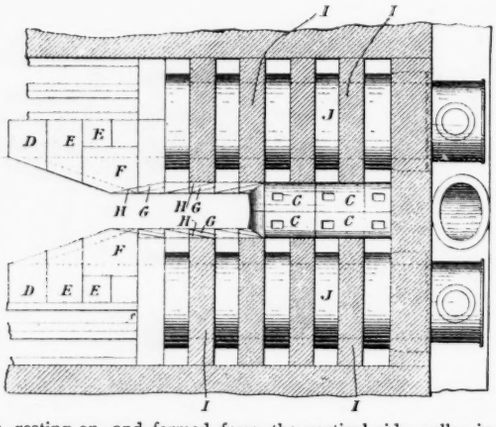
The whole of the iron structure and the conveying apparatus weighs about 65 tons, and has cost £3000; while the complete installation, including electro-motors and accessories, will entail an outlay of about £4000. Its erection was begun in the autumn of last year, and it was ready for work last spring. Details of the working, when available, will form interesting reading.

REGISTER OF PATENTS.

Generators for Heating Gas-Retorts.—Irving, D., of Bristol, and Gibbons, W. P. & G. B. A., of Lower Gornal, Staffordshire. No. 22,786; Nov. 12, 1901.

This invention relates more particularly to gas-retorts set on the inclined system. Hitherto generators for such retorts have been constructed with the top covered in by an arch composed of bricks or

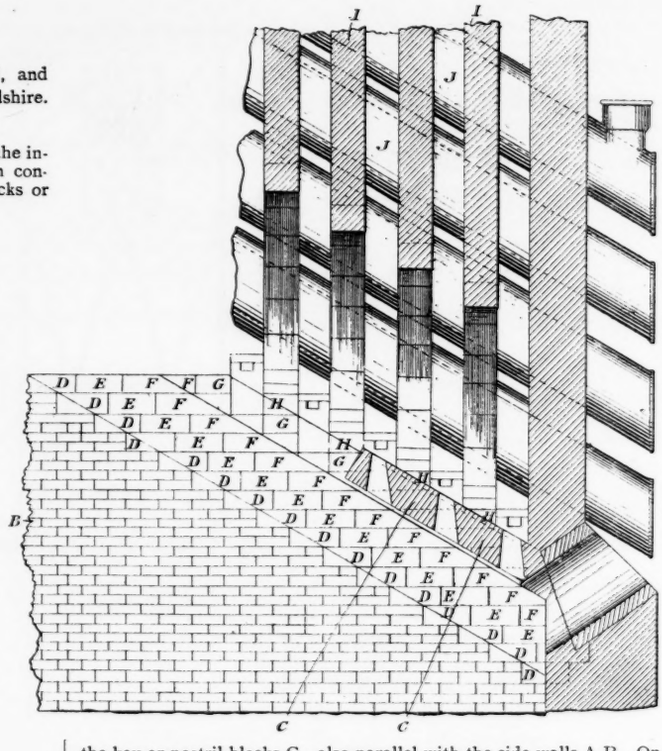




blocks, resting on, and formed from, the vertical side walls—in the arch being nostrils for the gases to pass through. The present invention consists in the formation of this usually arched upper portion of the generator by corbelling over the side walls by means of specially formed or moulded blocks or tiles, upon the upper tiers of which are placed the key-bricks with nostrils formed in them for the gases to pass through. In this way, increased stability is obtained, as each block or brick is set on a horizontal bed having vertical joints; and they are all properly bonded, both in the producer and the partition walls of the setting built above. It is claimed that the retorts and the setting are prevented from slipping towards the front (a defect in the ordinary constructions), and the stress is taken off the iron or steel stays or bracings usually required in inclined retort-settings.

The illustrations show: A longitudinal sectional elevation of a portion of an inclined retort-setting in which the nostril-bricks or key-bricks of the producer-arch are carried up parallel to the retorts, and with the upper portion of the gas-generator constructed in accordance with this invention; a cross section of same; and a sectional plan.

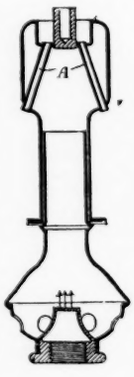
The two side walls A B are constructed of ordinary fire-bricks or blocks up to the requisite height—that is, to the diagonal line from which the arch springs; and here the side walls are stepped from front to back, to the same angle as the slope which the nostril or key-blocks C take. To this point, the walls are vertical; but above the steps they are continued by tiers of specially moulded fire-brick blocks. All the moulded blocks in any one tier are similar in shape and construction, but are made with right-and-left hand faces for the right and left hand sides of the generator. The first tier of the moulded blocks (marked D) are constructed with the front or inner face so shaped that, while the lower portion of the face is linable with the face of the vertical wall A or B, the remaining portion forms an oblique corbel, which is the commencement of the arch. On the tier of blocks D a further tier of blocks E is placed—thus continuing the corbelling—each of which has an inclined front face all along. On this tier of blocks is laid another tier of blocks F, each having a part of its inner face cut to complete the oblique corbel in a line parallel with the sides of the producer, and another portion cut on its upper side to form the lower portion of the outwardly inclined support for



the key or nostril blocks C—also parallel with the side walls A B. On every alternate block of the tier of blocks F is laid a block G having its front face bevelled to correspond with the bevel of the blocks F, so as to continue the support to the key or nostril blocks C. On these blocks G is placed a final tier of blocks H, each of which has the lower portion of its inner or front face cut to such a bevel as to complete the support for the key or nostril blocks C; the upper portion of the inner face of the blocks H being vertical. The whole of the tiers have their inner faces so cut as to break-bond in the vertical joints.

On the tiers described, the partition walls I for the retorts J are built—the weight of the partition walls and of the retorts being transmitted through the tiers or blocks to the side walls A B; and as all the joints of the special blocks D E F G H are vertical and horizontal; "the arch has no tendency to slip forward."

The passages K^1 K^2 are the hot-air passages, and the other side passages M^1 M^2 are for the waste gases to the stack.



Incandescent Gas-Burners.—Boult, A. J., a communication from J. Braunstein, of Berlin. No. 25,590; Dec. 14, 1901.

This invention relates to so-called "intense-light burners." It is constituted mainly "of the simple parts formed in one or other form of the ordinary burner, but so modified that an intense-light burner is produced in a simple and cheap manner."

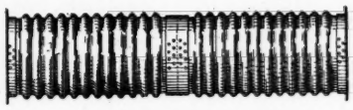
As shown, the burner comprises one or more inclined tubes A, through which fresh air is introduced beneath the mantle, and a mixing-tube, the upper portion of which is cylindrical while its lower portion, provided with air-admission openings, is bulbous, and surrounds the gas-inlet nozzle. There is a cap adapted to be placed over the burner, having a central cup-shaped recess in its top surface and air-tubes extending downwardly and outwardly therefrom in combination with a mixing-tube, the upper portion of which is cylindrical, while its lower portion (provided with air-admission openings) is bulbous, and surrounds the gas-inlet nozzle.

Expansion Joints for Water-Mains.—Bewlay, H., of Birmingham. No. 25,827; Dec. 18, 1901.

In long lines of water-pipes, the patentee remarks, it is usual to provide for expansion and contraction—particularly in lines laid in tunnels and above ground. Hitherto, sliding expansion joints of cast iron have been used, but they are liable to get out of order; and his invention is to provide expansion joints formed of corrugated steel tube, similar to the corrugated flues in marine boilers.

It is obvious, he says, that the circumferential joints of the expansion tubes, and also the circumferential joints of the pipes near to them, must be stronger to resist expansion or contraction than the corrugations in the proposed expansion joint; otherwise the expansion will take place in the joints, and not in the corrugations. By his invention, he makes the circumferential joints of the expansion pipes (as shown) either butting up against each other, or to other pipes, with a covered riveted or bolted joint of ample strength; or he forms or welds on to the joints strong flanges of a thicker metal than the expansion joints are themselves composed of, or in some cases the pipes

may be connected by angle steel flanges, the joints being bolted or riveted up in the usual way. In cases where the joints may be partially weakened by flanging or rivet holes, thickened edge plates, specially rolled for the purpose, are made use of. It is, of course, important in

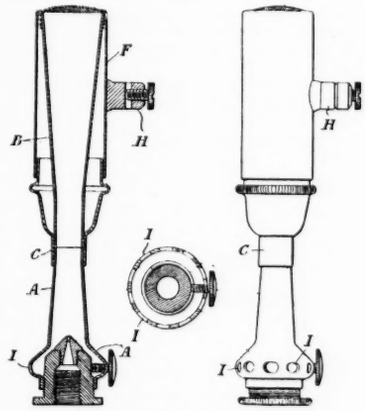


these expansion joints that the corrugations shall in no way reduce the bore of the main. The corrugations are therefore formed all above the inside diameter—that is to say, the diameter across the bottom or inside corrugations is fully as great as the inside diameter of pipes to which expansion pipes are connected.

High-Pressure Incandescent Burners.—Keith, J. & G., of Farringdon Avenue, E.C. No. 26,198; Dec. 23, 1901.

This invention is a development of that described in patent No. 16,955 of 1900; and it has for its object to simplify the construction of burners of the kind referred to, and to adapt the body parts to be stamped and drawn or spun from sheet metal.

As shown, the burner-body is made up of two tapered tubes or long truncated cones A and B, whose narrower ends abut and are united by a thimble C fitting closely over the joint; the thimble being expanded upwards into cup form, and having a ring or shoulder formed on it to serve as a support for the mantle holder, which is of cylindrical tubular form and is slipped over the upper truncated cone, which carries the



usual wire gauze, and fits on to the top of the cup part. The mantle holder is formed with a boss H having a screw for holding the mantle support. The lower truncated cone A is swelled out to larger diameter near its lower end, and has a number of air-admission orifices I formed in the swelled part.

The adjustment of the air supply is obtained by screwing the burner-body A up or down on the lower cone (attached to the gas-supply fitting in the usual way), whereby the annular space between the cone and the swelled part of the burner-body is increased or diminished. This annular space is of such a form as to introduce the air at an angle of about 45° to the centre line. When the proper adjustment is obtained, the burner-body is fixed and held by a screw passing through it and bearing on the cone.

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23,929.—Ewart, J. W., "Thermostats as applied to controlling the supply of gas." Nov. 3.

23,934.—Izzett, J., and M'Geachie, T., "Regenerative gas-furnaces." Nov. 3.

23,986.—Hirsch, J., "Incandescent gas-mantles." Nov. 3.

23,998.—Wilson, A., "Gas-producers." Nov. 3.

24,001.—Danvin, R., "Incandescent burners." Nov. 3.

24,029.—Glover, T., and Moon, P., "Advertisement gas-meter." Nov. 4.

24,036.—The National Dry Gas-Meters, Ltd., and Schofield, A., "Dry gas-meters." Nov. 4

23,069.—Seal, J. W., "Internal combustion engines." Nov. 4.

24,079.—Boulton, J., and Spaull, B.A., "Manufacture of potassium cyanide and sodium cyanide." Nov. 4.

24,119-20.—Aron, H., "Dry gas-meters." Nov. 4.

24,152.—Thwaite, B. H., "Purification of blast-furnace gas." Nov. 4.

24,161.—Brett, C. G., "Incandescent gas-burners." Nov. 5.

24,194.—Crossley, W. J., and Rigby, T., "Production of gas from bituminous coals." Nov. 5.

24,195.—Casey, A. & P. A., "Gas-engines." Nov. 5.

24,251.—Arzt, A. H., "Gas or vapour burners for heating." Nov. 5.

24,288.—Hebron, A. F., "Gas cooking and heating stoves." Nov. 6.

24,343 4.—Hoddle, C., "Generating and storing acetylene gas." Nov. 6.

24,355.—Claudel, C. H., "Gasification of combustible liquids." Nov. 6.

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24,379.—Clapham, T. S. & S. B., "Regulating the flow or ingress and egress of gases." Nov. 7.

24,387.—M'Kellar, M., "Incandescent gas burners." Nov. 7.

24,419.—Small, J. M., "Gas or vapour driven turbines." Nov. 7.

24,451.—Simmance, J. F., and Abady, J., "Heating water by gas." Nov. 7.

24,452.—Simmance, J. F., and Abady, J., Incandescent street lanterns and burners." Nov. 7.

24,453.—Simmance, J. F., and Abady, J., "Gas-fires." Nov. 7.

24,488.—Cross, J. W., "Exhaust silencers for internal combustion engines." Nov. 8.

24,490.—Smith, W., and Hinchley, J. W., "Recovery of ammonia from producer and other gases." Nov. 8.

24,498.—Ford, T. & F., "Fittings for gas." Nov. 8.

24,523.—Bousfield, J. E., "Reducing valves." A communication from E. W. Hopkins. Nov. 8.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by correspondents.*]

Loss of Heat by Flues to Gas Fires and Stoves.

Sir,—The loss of heat by flues to gas fires and stoves has, I think, never been determined; nor is it likely that any rule can be formulated, as it is impossible to get the same results twice, owing to the constantly varying conditions. But it is quite certain that, in some cases, with excessive flue draught, practically the whole of the heat evolved may be lost.

In one instance, a warm-air stove consuming 12 cubic feet per hour was placed in a small room in front of an open fire-place, with a good chimney draught, without any flue-pipe or connection of any kind; and in two hours it failed to raise the temperature of the air in the middle of the room ¼° Fahr. It had a red glass front, and looked warm. The occupants of the room believed that it did warm the place; but this was simply imagination. Another case which came under my notice in some experiments made for a different purpose, shows, I think, the maximum which can be obtained by the use of a flue, as compared with a flueless arrangement. In this instance, in our experimental room, arranged specially for the purpose, the full theoretical duty of a flueless stove can always be obtained; and when the same amount of work is done with a flue which removes the products of combustion, but with the ventilation no greater than absolutely necessary for this, the difference in duty, shown by the temperatures of the air in the room after 2½ hours, indicates a loss of exactly 28 per cent. by the flue. This, considering the ventilation of the room, which, though very limited, was sufficient to prevent it becoming unpleasant, is probably the highest duty ever likely to be obtained under the most favourable circumstances—rarely to be secured in practice.

It is very probable, judging from the two extremes given, that, in average practice, at least 50 per cent. of the total heat evolved in gas fires and stoves with flues will be completely lost; and the matter is one which requires more attention from fitters than has been given to it.

Warrington, Nov. 14, 1902. Thos. Fletcher.

Why Milwaukee Did Not Build Inclines.

Sir,—Mr. R. Brown's paper would perhaps have passed unnoticed had it not been for the discourteous manner—to put it mildly—in which this gentleman "spread-eagled" the entire question of inclined retorts, and relegated to the limbo of the lost those who had, in his opinion, the misfortune to have burned their boats.

It is not the writer's intention to traverse the mighty dollar calculations set forth in the paper, containing as they do so many inaccuracies; but he wishes particularly to refer to the last paragraph, in which Mr. Brown shelters himself behind the quotation of a "Very successful Engineer on the other side," who states that they (the inclines) are expensive to erect, difficult to repair, incapable of being worked by hand in the event of a breakdown in the machinery, or unsuitable coal having to be dealt with, give a lower yield of gas per ton, depreciate the illuminating power, are uncertain in productive capacity, and more trying to the workmen than horizontal retorts with manual or power stoking machinery." Now this is a truly large and fairly comprehensive order, and likely to cause annoyance. Under the circumstances, therefore, we should much enjoy the pleasure of the acquaintance of this "very successful Engineer resident on our side;" so please trot him out, Mr. Brown, and make him your "whipping boy," because it will afford us much greater fun to heckle this "Very successful Engineer," our countryman and neighbour, than to say unkind, and possibly discourteous, things anent the backslidings of the Milwaukee which did *not* build inclines. Trot him out, please, Mr. Brown.

Copenhagen, Nov. 14, 1902. F. D. Marshall.

The Directors of the Continental Union Gas Company, Limited, have decided to recommend to the proprietors, at the general meeting to be held on the 9th prox., dividends for the half year of 4 per cent. on the ordinary stock, free of income-tax, and of 3½ per cent. on the preference stock, less income-tax, making 8 and 7 per cent. respectively for the year.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Wednesday, Nov. 12.

(*Before Mr. Justice* LAWRANCE *and a Special Jury.*)

Waters and Wife v. Brighton and Hove General Gas Company. Alleged Poisoning by Water Gas.

In this case the plaintiffs claimed damages for injuries sustained in consequence of the alleged negligence of the defendants or their servants. Defendants denied both the negligence and the damage.

Mr. MARSHALL HALL, K.C., Mr. HOHLER, and Mr. PITMAN appeared for the plaintiffs; Mr. BRAY, K.C., Mr. BOXALL, K.C., Mr. BOYDELL HOUGHTON, and Mr. INGLEBY ODDIE represented the defendants.

Mr. MARSHALL HALL, in opening the case, said the matter was one of considerable public interest, especially to gas consumers. The plaintiff was a surveyor and estate agent, and last year he and his wife took a flat at No. 123, King's Road, Brighton. There had been in the house a supply of gas; but it had been cut off from the upper portion, and electric light used. Gas was employed in the lower portion of the building for cooking purposes. In the upper part, tenanted by the plaintiff, there were in the front bedroom two disused gas-pipes—one on either side of the window. On Dec. 19, 1901, Mr. Waters determined to have a gas-fire in his bedroom; so he went to the defendants because they not only made and supplied gas, but supplied stoves and did gas-fitting. He selected a stove, and gave instructions that it should be fitted, and that the supply-pipes should be inspected and carefully attended to by an experienced man. There had been a gas-fire in the bedroom before, which had been taken away. On the 23rd of December, a man was sent to do the work. Mr. Waters saw him, and called his attention to the two gas-pipes in the wall. The man said that after he had made the connection he would test the pipes, and see that everything was all right before he left the premises. A foreman came while the man was working, and also gave him express instructions that everything was to be done properly. The man was about the house a good time, and duly re-connected the pipe where it had been cut off from the gas-fire. This brought the whole of the piping into play, and thus the two pipe ends on each side of the window became "live" pipes, because they were continued from the gas-fire. In each of these pipes there was a wooden plug, and the proper thing to do was to take each one out, and screw a cap over the pipes to hermetically close them. The workman did this to the one on the right-hand side of the window, but omitted to attend to the other. Mr. and Mrs. Waters retired to rest at eleven o'clock, assuming everything to be right. The fire was lighted, and Mr. Waters turned the gas out before getting into bed. He perceived an odour of burning black and red lead coming from the new stove; and there was no doubt that this disagreeable smell disguised any escape of gas. In the morning, about seven o'clock, Mr. and Mrs. Waters awoke feeling very ill. Mr. Waters tried to get up, but was almost comatose, and fell to the floor vomiting violently. Mrs. Waters was not so bad, as, from the position in which she had slept, she seemed not to have taken such deep inhalations as her husband. On investigation, it was found that the workman had never touched the left-hand pipe and had left in the wood plug, which would not prevent an escape of gas. While the fire was burning, of course very little gas would go past it, but when it was turned out, the gas would escape from the plugged pipe, and the plaintiff and his wife had been breathing gas all night. The case would not have been so bad if it had not been for the quality of the gas supplied by the defendants. Of late years, gas companies had introduced into this country from America water gas, which contained a very large proportion of carbonic oxide, and was very cheaply made. The Brighton Company found it was very advantageous to make water gas and mix it with their coal gas; and they took credit to themselves that they had been able to save their consumers 2d. per 1000 cubic feet by the use of this gas. But so dangerous was it considered, that a Departmental Committee was appointed to investigate the matter, and it was proved beyond all question, as shown by the report of the Committee, that water gas was a very dangerous thing indeed, and that some legislation was necessary to fix the maximum amount which should be allowed in gas supplied for ordinary domestic purposes. In the present case, the attention of the defendants had been particularly drawn to this matter, because there was evidence in writing from Dr. Newsholme, the Brighton Medical Officer of Health, who held very strong views on the subject. He wrote to Mr. Cash, the Company's Engineer, and called his attention to the fact that he (Dr. Newsholme) thought they ought not to allow more than 12 per cent. of carbonic oxide to be mixed with their gas, especially at night. Mr. Cash wrote back stating that he did not agree with the conclusions of the Committee, and that unless statutory regulations were made, he would not agree to a minimum of 12 per cent. On the night in question, there was not less than 13 per cent. of carbonic oxide in the gas; and on the two previous nights, 13·2 per cent. The plaintiff, of course, knew nothing about this; but he felt very ill. He struggled down to the Company's office a short distance off, being sick on the way, and saw the Manager. He was courteous and apologetic, and said he would send a man at once. When the matter developed, Mr. Waters had an interview with the head man, who told him that they had sent a man who had not done such a job before, that he was inexperienced, and had been employed to clean out meters and do other work of that sort. Mr. Waters vomited discoloured blood, and consulted his doctor, who at once discovered that he had been poisoned by this carbonic oxide. Plaintiff issued a writ in the County Court to recover £50 damages; but, on consulting several doctors before the trial, it was discovered that he had sustained permanent serious injury to the top of his right lung—the poison having got into his system. He gave notice to discontinue the County Court action, and commenced proceedings in the High Court for larger damages, paying defendants 18 guineas towards their costs in the Lower Court. The Company had not made any offer of compensation; and, from the trouble they had given plaintiff, they appeared to think he was making an exaggerated claim. There could be no question of liability, and the only one was as to damages. He would call Professor Smith and Dr. Newsholme, and they would say that it was an incontrovertible fact that when a person inhaled this carbonic oxide in poisonous doses they had lung trouble. Plaintiff had been making an income of £1000 a year; but he had been advised to give up business in this country and reside abroad if he wished to live. Under these circumstances, he claimed substantial compensation. As regards Mrs. Waters, she was not seriously affected and did not claim anything very substantial.

Mr. *William Richard Coventry Waters*, the plaintiff, then gave evidence in support of his case.

Thursday, Nov. 13.

On the resumption of the hearing this morning,

Mr. *Waters*, in cross-examination by Mr. BRAY, said that if he had known the Company supplied water gas he would not have had the stoves at all. He still used them for cooking purposes. He accepted his Counsel's statement that a Departmental Committee had recommended that 12 per cent. of water gas was the maximum that should be used at night.

Mr. BRAY read a passage from the report to the effect that, as the circumstances varied so much as to pressure, &c., perhaps 16 per cent. would be a proper limit.

Mr. HALL replied that the Committee's conclusions were that "power should be conferred upon a Central Department to make regulations, enforceable by adequate penalties, limiting the proportion of carbonic oxide in the public gas supply at night to 12 per cent., or such greater amount as the Department may consider desirable."

Witness further said he only knew in March that water gas was supplied, and he would never have had it in his bedroom if he had known it before.

Mrs. *H. Waters*, wife of the plaintiff, deposed that on the morning after the escape of gas, when she sent for the workman, the man came and acknowledged that he had omitted to plug one of the pipes in the bedroom. He afterwards properly plugged the pipe. There was a piece of wood in it at the time. Subsequently, Mr. Sandeman, the Manager of the Black Rock branch of the Company, said the men who did the work at plaintiffs' house had only been employed a few weeks, and had been cleaning stoves—the job at plaintiffs' house being their first one of the kind.

Dr. *George Morgan* said he was a shareholder in the Company, and attended the plaintiff in his illness, which he attributed to gas poisoning. The inhalation of carbonic oxide was dangerous to health, and if taken in sufficient quantity, was fatal.

Cross-examined: He had not had another case of gas poisoning for eleven years, when he attended three children who recovered. He could not say it was a fact that the effects of carbonic oxide on the blood could be eliminated in six hours. From what he had read in the blue-book, he should expect a man to be able to walk half-a-mile within three hours of being poisoned by gas. It was one of the extraordinary symptoms of the malady that one appeared to recover very rapidly, and then relapsed again. Some of the symptoms described were consistent with the plaintiff having influenza; but not all.

Re-examined: Dr. Haldane was the highest recognized authority on this matter, and he (witness) agreed with the statement made by him in the blue-book that the after-symptoms of carbonic oxide poisoning were often of a very serious nature, and that the effects of it might remain long after the carbonic oxide had been eliminated.

Mr. HALL stated that plaintiffs' advisers had made every effort to get Dr. Haldane to give evidence; but he was a very busy man, and never would give evidence unless he was obliged.

Dr. *Perry*, of Tunbridge Wells, corroborated this, and said that Dr. Haldane's views were generally accepted as authoritative. Witness had not treated any other case of carbonic oxide poisoning.

Dr. *Arthur Newsholme*, Medical Officer of Health for Brighton, said the Company first introduced water gas in 1895-6. In ordinary coal gas, the proportion of carbonic oxide was 7 per cent.; but water gas, which was much cheaper to manufacture, contained about 30 per cent. Water gas was not in itself an illuminant, but had to be treated to give it illuminating properties. Carbonic oxide was its sole dangerous constituent, and at present there was no regulation as to the quantity to be allowed in it. Both witness and Mr. Cash, the Company's Engineer, gave evidence before the Departmental Committee. Dr. Haldane was on the Committee; and the report was published in 1899. After this he wrote to the defendants suggesting that at night time, they should limit the proportion of carbonic oxide in their gas to 12 per cent.; but they refused to be bound down to any limit. He had heard the evidence of Mr. Waters, and his statement was absolutely consistent with carbonic oxide poisoning, and with nothing else. Having regard to the pressure of gas, and the 4½ cubic feet per hour, which it was calculated would escape from the pipe, together with the size of the room, he asserted that there would be enough carbonic oxide to cause serious results. On a cold night, water gas, after rising as it heated, would fall as it cooled to the level of the bed more easily than coal gas. The danger increased at a much greater rate, in proportion, than the amount of the carbonic oxide increased. The cherry-coloured blood which plaintiff expectorated, he attributed to the poisoning.

Cross-examined by Mr. BOXALL, witness said he had no personal knowledge of cases of gas poisoning. All he was stating was his experience derived from experts and books. He could not point to any book in which it was stated that cherry-coloured blood could be seen in any case four days after the poisoning. He knew that many of these cases occurred among the men in gas-works, and that there were medical men who had special opportunities of observing what happened. But he had not taken the trouble to ascertain whether this cherry-coloured blood, four days after the event, was a symptom they had ever seen. In his opinion, water gas ought not to be used at all, unless special care was taken—more care than was taken at the present time—with the gas-fittings. Asked if he knew that it was used by the London Gas

Companies almost universally, he said he believed it was being sent out to an increasing extent every month. He did not know, from personal knowledge, any place where it was not used; but he should think it was not employed in many towns.

Mr. BOXALL: Do you know it is used in Eastbourne, Hastings, Bournemouth, Scarborough, Bridlington, Southport, Southend, in all the other large towns, and throughout the whole of London without exception?

Witness: I know it is used in Liverpool, because there were some cases of poisoning there.

But I suppose there were cases of gas poisoning before water gas was known?—Certainly.

Do you know that there has been a representation lately made by the Officer of Health for London, or the Chief of the Chemical Staff of the London County Council, that the Council should have a limit put to the amount of carbonic oxide allowed?—That is practically the same as the recommendation of the Departmental Committee.

And that the Council were recommended to limit the amount to 14 per cent.?—I think that is too high, unless there are specially good fittings.

Do you know that what was sent out by the defendant Company was less than that recommended by the Committee; the highest they reached being 13·2 per cent.?—No; I believe you will find, in the evidence of Mr. Cash before the Committee, that at times it was higher, but at the time of the accident it was 13·2 per cent.

So that it was below the limit which it was suggested might be allowed.—That is so.

Cross-examination continued: All he had said about what happened in the room was founded on the assumption that there were 4½ cubic feet of gas per hour escaping from the bracket. He had no knowledge about the size of the pipe; nor had he assumed that it was not stopped at all. He had simply assumed that 4½ cubic feet were escaping. This was the figure given to him by an architect; and he had not made any allowance for ventilation.

Re-examined: Even making all allowance for ventilation through the window-sashes and door, there would still remain enough gas to poison the plaintiffs.

Friday, Nov. 14.

When the case was resumed this morning,

Fanny Waldron, the plaintiff's servant, was called, and deposed to finding her master and mistress very ill in the bedroom, and detecting a strong smell of gas in the room. The gas-pipes were not concealed in any way.

Harry Goodwin, a plumber and gas-fitter, of Maidstone, said he had been in the business for 25 years, and had been a teacher of the plumbing class in the local Technical School. He examined the gas-pipes and fittings at 123, King's Road, Brighton, on the 2nd of July. The bracket points should have been plainly visible to everybody. In turning a "dead" pipe into a "live" one, it was the workman's duty to test the pipe carefully, to see that there was no leakage. In his opinion, there was no difficulty in discovering a leakage.

Cross-examined by Mr. BOXALL: His own Company—the Maidstone Gas Company—he believed were using water gas; and he did not know of any company who were not employing it to enrich the gas. In fact, he believed its use was almost universal. It was not a good test to blow down the pipes to see if there was a leak. Some gas-fitters did this; but he should certainly not do so. Such a test would show if there was an open pipe; but it was only a rough test.

Re-examined: The fire burning very weakly after the connection would indicate that there was something wrong, and that air was being sucked in somewhere.

By Mr. BOXALL: If the supply-pipe was too small, that would make the fire burn weakly also.

Mr. *W. B Jury*, plumber and fitter, of Messrs. Jury and Sons, Tunbridge Wells, said he went with the last witness and examined the rooms at Brighton. He agreed with his evidence, and held that the fire burning weakly would have shown something was wrong. If gas escaped into the chimney and air got in too, there might be an explosion.

Dr. *Burney Yeo*, a physician of Mayfair, of 30 years' practice, and Consulting Physician to King's College, was the next witness. He examined plaintiff (Mr. Waters) on the 26th of March, and found the throat relaxed and the breathing movements feeble and embarrassed. The results of his condition were consistent with poisoning by coal and water gas. He had examined the plaintiff in the present week, and had found that he still showed signs of chronic pleurisy, which would render him liable to tubercular disease, and he would not advise him to winter in this country. He thought some of the effects must be permanent.

By Mr. BOXALL: It was quite new to him to hear, on the authority of Dr. Haldane, that the symptoms of coal-gas poisoning were almost exactly similar to those of alcoholic poisoning. These, he thought, would be the symptoms of acute poisoning. Witness was not told that no doctor had been called in to the plaintiff for four days after the occurrence, nor that the plaintiff went out the same morning.

By Mr. MARSHALL HALL: Until the mixture of water gas with ordinary coal gas had been introduced from America, poisoning by carbonic oxide was extremely rare, except by means of charcoal.

Professor *W. R. Smith*, Director of the Laboratories at King's College, said he had heard the plaintiff's evidence, and a case where a more serious condition resulted four days after the occurrence was not at all uncommon. Plaintiff's condition was quite consistent with carbonic oxide poisoning. Witness had studied this matter for years; and it was quite consistent with the poisoning that the plaintiff would be able to go out on the morning of the occurrence. He thought a patient who had inhaled carbonic oxide might have resultant nervous symptoms, pneumonia, or affection of the lungs; and he agreed with Dr. Yeo's evidence on this point.

By Mr. BOXALL: He had not examined the plaintiff personally, but had unfortunately had experience in his own family of poisoning by coal gas.

By Justice LAWRANCE: The result of putting water gas into ordinary gas was to largely increase the quantity of carbonic oxide in it.

Mr. MARSHALL HALL: The quantity of carbonic oxide in coal gas was about 8 per cent., but in water gas about 30 per cent.

Justice LAWRANCE: Yes; I understand the result of the use of it is to largely increase the amount of poisonous matter.

Dr. *Smith*, cross-examined by Mr. BOXALL, said he agreed with the last witness that the symptoms of the plaintiff were consistent with toxic poisoning.

The dimensions of the room in which the escape of gas took place, and of the pipe, showing the quantity of gas which escaped, were then put in, and this closed the case for the plaintiff.

THE DEFENCE.

Mr. BRAY said the case was one of difficulty, but it was also one of great importance; and the Jury would have to say which story they believed. The first question to be dealt with was as to whether or not there had been negligence on the part of the Company; the second was whether Mr. Waters had been injured by it; and the third was what pecuniary damage, if any, he had suffered. The defendants' case was that Mr. Waters had grossly exaggerated his case, and that he had lost absolutely nothing from a pecuniary point of view by the occurrence; and this statement would be justified by a great deal of the defendants' evidence. The plaintiff's story as to the admission of the employment of inexperienced workmen, &c., would be absolutely denied. He had not the least hesitation in telling the Jury that he had no doubt Mr. Waters had told them what he knew to be untrue, in order to make out a strong case. He suggested that the plaintiff's condition was due to influenza or pneumonia, with cold or something of that kind, and was not at all due to gas poisoning; and his submission was that, even if there was any escape of gas, it was not more than one-fourth of a cubic foot per 3½ hours, which was so small as to be quite innocuous. The history of the case was that Mr. Waters grew gradually worse, which would be consistent with disease; but it was not consistent with gas poisoning, because defendants' evidence would show that when once the immediate effects of the gas were stopped, the patient got rapidly better. He submitted that it was quite obvious, both from documentary evidence and from Mr. Waters' action, that in 1901 he made up his mind to retire, and practically did so, leaving his business in the West-end, selling all his books, taking a flat at Brighton, and doing nothing except some private speculation. It was therefore obvious that, even if Mr. Waters could make the Company liable, he was not entitled to heavy damages.

Mr. *D. S. Cook*, Chief Inspector of the Company, said he saw Mr. Waters on the evening when the occurrence took place. He said he was very ill, but his wife was quite prostrate. Waters looked more angry than ill.

Cross examined by Mr. MARSHALL HALL: He believed Crossthwaite, the man who did the work at plaintiff's house, had been in the employ of the Company about three or four weeks when he was given the job; but he was not aware that the man was discharged by the Company immediately after.

Edward Faulkner, under-foreman of the Black Rock works, said the ordinary test in cases of fixing stoves was turning off the gas at the meter, blowing the pipe full of air, leaving it for ten minutes, and then turning the tap on to see if a fair supply of air was returned. On the 24th of December, witness went to Mr. Waters' house and found Crossthwaite there; but there was no smell of gas then. He told plaintiff he was sorry there was an escape of gas, but he could not stay with the fitter all day, as he had a large district to cover. Mr. Waters said he had a heavy cold on him at the time. He (witness) saw one of the brackets at the side of the window which Crossthwaite had properly plugged, but he did not look to see if there was a bracket on the other side. He left all that to the fitter. He should never have expected to find two brackets in such a window. He thought, on the 23rd, that the gas-fitting job was merely a temporary one for the night.

Cross-examined by Mr. MARSHALL HALL: He was under the impression that large pipes were going to be put in the house afterwards; but he asserted that the same care in testing would be exercised for a temporary as for a permanent job. Christmas was a very busy time with the Company. Crossthwaite had not left the Company after the accident, but was in their employ now.

Mr. MARSHALL HALL: Was this the first job Crossthwaite had done in stove-fitting?

Witness: Not by many.

Had he an air-pump with him?—He fetched one on the 24th to make sure of the connections; but he had none with him on the 23rd.

Do you ever use a force-pump for testing purposes?—Yes.

Do you ever use your mouth for the same purpose?—Sometimes.

Where do you say the escape of gas came from?—I cannot say. I might tell if I tested the gas and found it.

What has become of the wooden plug which was in the pipe?—Crossthwaite took it and put it in his bag.

Where is it now?—I do not know. I should have taken the plug to show the pipe was tight, as there was the mark of the screw in it.

If this plug was tight, why was a steel one put in the other?—Because it is not right to keep a wood plug in.

In further cross-examination, witness said he did not see the room prepared for the workmen, but he thought the bed was covered up.

Re-examined by Mr. BRAY: Unless specially instructed, he should test pipes by blowing down with the mouth, and they should judge an escape by the meter. It was most common to have only one bracket at the side of a window in Brighton. There was no indication that there was another pipe under the window. He did not think there could possibly have been any considerable escape from the pipe which was wood plugged.

At this stage, the case was adjourned till yesterday, when witnesses were called on behalf of the defendants. The first was the fitter who did the job at the plaintiff's house, and then came others of the Company's employees. They were followed by Mr. A. Easton, Mr. G. F. L. Foulger, Mr. J. Cash, Professor Lewes, Sir Hugh Beaver, and Dr. Heron; and the further hearing was adjourned till to-day.

GREENWICH POLICE COURT.—Friday, Nov. 14.

(*Before Mr.* C. E. T. D'EYNCOURT.)

The Crystal Palace District Gas Company's Purification Case.

It will be remembered that in July, 1901, the Crystal Palace Gas Company appeared at the above Court in answer to six summonses issued at the instance of the Lewisham Borough Council for carrying on an offensive "trade, business, process, or manufacture, causing effluvia," which was alleged to be a nuisance, on April 26, 27, 29, and 30, and May 4 and 10 of that year. The summonses were taken out under section 21 of the Public Health Act, 1891. At the first hearing, a great deal of evidence was given by residents in the neighbourhood of the works as to the existence of a nuisance; and at the second hearing, after Mr. E. H. Stevenson had been examined on behalf of the Council, Mr. D'Eyncourt stated that he was satisfied there was evidence of a nuisance, and the question was whether the Company were prepared to remedy it. This statement was made before the Company's witnesses had been under examination. The defendants sought to show that they were using (employing the words of the Act) "the best practicable means" in their process of gas purification—scientific and engineering evidence being called in proof. The assertions as to the nuisance were declared to be very much exaggerated. Mr. Stevenson, in his evidence, suggested that increased purifying area was the remedy; but Mr. H. E. Jones, for the Company, denied the insufficiency. The upshot was that the case was adjourned *sine die*, with liberty to apply to have it re-instated, on the understanding that Mr. Jones on the one side and Mr. Stevenson on the other, would endeavour to agree upon what was necessary to abate the nuisance. The case now came before his Worship on the application of the Council—they alleging that the Company had done nothing in the matter.

Mr. LEYCESTER appeared for the Council; while Mr. RYDE again represented the Company.

Mr. D'EYNCOURT having stated his recollection of the facts,

Mr. RYDE said, in reply to an inquiry by his Worship, that the Company had made several changes in the manufacture of gas. They had reduced the proportion of water gas by some 50 per cent., and they had altered the system of purifying the water gas, eliminating altogether lime from the process. They had also changed the method of purifying the coal gas; and he should call evidence to prove that they had done all that modern science could suggest. The Company believed they were on the safe side before; but whether they were or not, they were certainly well on the safe side now.

Mr. LEYCESTER said he proposed to call witnesses from the neighbourhood to prove that there had been no diminution of the nuisance in any way since the previous hearing—in fact, the proceedings had been entirely ineffective. On Oct. 25 last year, Sir George Livesey saw Mr. Stevenson; and it was arranged between them that the water gas, which was chiefly responsible for the nuisance, should not be manufactured on the works in future, except in cases of emergency. It was also suggested that re-arrangements should be made in the purifiers, which, it was hoped, would prevent the nuisance recurring. Of course, in the winter, the Company could not be expected to execute works of any gravity. But, on July 3 of this year, Mr. Stevenson and Dr. Harris, the Medical Officer of Health, visited the works; and they would tell his Worship that not only was it obvious from their observations that no alterations had been made, but it was admitted by Mr. Shoubridge, the Company's Engineer, that such was the case.

Mr. D'EYNCOURT: Then I understand, Mr. Ryde, that alterations have been made since.

Mr. RYDE: Some were made before, and others since.

Mr. LEYCESTER remarked that, whatever alterations had been made, they were unaware of them; and they had anyway been ineffective. All he had to prove was the existence of the nuisance; and it was for the other side to satisfy his Worship that the "best practicable means" had been taken to prevent the nuisance—that was to say, if it was possible to prevent the nuisance, they must do it.

Mr. *E. Evans Leach*, of Laurel Brook, Castlands Lane, who gave evidence at the first hearing, asserted there had been no improvement in the nuisance since that time. Whenever the wind was in the direction of his house, they got the same smell, which caused a choking and very unpleasant sensation. It was generally in the morning that he noticed it.

Cross-examined: He had made no complaint to the Gas Company. It was about six in the morning that the smell was very strong.

Mr. RYDE: Do you notice it more in the winter than in the summer?

Witness: I cannot say I do.

Mr. RYDE: Then that effectually disposes of one point made on the last occasion.

Re-examined: In the winter, he did not have the windows of his house opened so much as in the summer, nor did he spend so much time in his garden.

A gardener in the service of Mr. George W. Beste, of 93, Perry Hill, Catford, also declared that the smell was no better this year than last; and a statement that he noticed a smell on the previous day brought from Mr. Ryde the admission that a purifier was opened about the time he named.

Mr. *Arthur R. Besant*, of Mayow Road, Sydenham, also spoke of having constantly noticed an offensive smell; and he asserted that there had been no improvement during the last twelve months. He and other residents signed a memorial on the subject, which was sent to the Borough Council, in order to bring the subject prominently to their notice again.

In cross-examination, he recognized a complaint which he addressed to the Gas Company on Feb. 5 last. Following this, an inquiry was made by Mr. Shoubridge; and Mr. Ryde in interrogating this and other witnesses sought to show that the smell they complained of came from burning ballast heaps between their houses and the gas-works. In this connection, it was also stated by Counsel that the complaint of this witness was one of only two that the Company had received. In further cross-examination, the same witness stated that the smell from the gas-works had been worse the last three years than formerly.

Mr. *Joseph Pratt*, also of Mayow Road, testified as to the smell, but admitted he had not noticed it so much since August last.

Mr. *T. Eamer*, residing in the same road, described the smell as abominable; but he also confessed that the last time he had any real complaint to make was in the beginning of August.

Dr. *Francis L. Hart*, of Kirkdale, Sydenham, said he had noticed the smell repeatedly in and about Lower Sydenham. It had at times "taken his breath away," but not alarmingly. It had an irritating effect on the mucous membrane of the lungs; and he should say it would be injurious to general health. But the last eight or ten months the smell had not been so bad.

Asked in cross-examination whether the general health of the neighbourhood had suffered owing to the smell, witness said he could only answer inferentially. He knew the health was very much inferior in Lower than in Upper Sydenham. The question was also put as to whether he really thought that any deterioration in health in the neighbourhood was owing to the gas-works, and the reply was that he was not prepared to say so. It was a most difficult and responsible thing to say.

Mr. LEYCESTER said he did not think any injury to health was complained of. The complaint was as a nuisance to comfort.

Dr. *A. W. Harris*, Medical Officer of Health for Lewisham, gave evidence as to smelling sulphuretted hydrogen from the gas-works at his house in Berlin Road, Catford, on June 24, Oct. 13, 18, 30, and Nov. 11. He also asserted that persons living in an atmosphere charged with sulphuretted hydrogen would become anæmic, and suffer from headache and general malaise. In answer to his Worship, he said it would not necessarily follow that a man working in a gas-works would be affected badly. A man employed in the retort-house would not be living constantly in an atmosphere charged with sulphuretted hydrogen; but in the purifying-sheds he should expect a man to become very pale where the fumes emanated strongly. Proceeding, he gave an account of his visit to the works with Mr. Stevenson on July 3; stating that Mr. Shoubridge then admitted that no alterations had been made since the previous hearing. On that occasion, there was no spent lime about the place.

Replying to the Magistrate, witness was positive that the smell in the direction of his house had been rather worse since August last.

On Mr. *E. H. Stevenson* being called, Mr. D'Eyncourt read the notes of his previous evidence and recommendations, which witness confirmed. Examined as to his interview with Sir George Livesey, Mr. H. E. Jones, and Mr. Shoubridge in October last year, he stated that, on that occasion, Sir George said he had made up his mind not to use carburetted water gas again, except in cases of emergency; and by not using carburetted water gas, the Company would certainly have done away with what he (Mr. Stevenson) regarded as a very considerable nuisance at the time. Sir George further told him that they were trying another system of purification for coal gas which had been successful elsewhere; and he had no doubt all nuisance would be cured. Nothing was then said as to the alterations he (witness) had previously suggested. He was assured that what was then proposed to be done would do away with all nuisance; and therefore he suggested to his clients that the matter should stand over until this year, as it was utterly impossible for the Company to do anything in the way of alterations during the winter season. On July 3, with Dr. Harris, he saw Mr. Shoubridge again; and in answer to a direct question of his, Mr. Shoubridge said that no alterations whatever had been made. As they were walking through the works afterwards, he (witness) saw no structural alterations. He spoke about the coal-gas purifiers; and Mr. Shoubridge told him they were working much better than they had been when he (witness) was there before. As to the water gas, he asked to look at the carbonizing book, and saw that carburetted water gas was still being used very largely. He examined the book for some portions of the period which had elapsed since the previous hearing. Mr. Shoubridge also informed him that they usually emptied the purifiers early in the morning; but they took the air-plug out over night, so as to get the gas out of the purifier during the night. The greater nuisance, of course, occurred when the material was taken out of the purifiers. If there was free sulphur in the lime, as soon as the oxygen of the atmosphere came upon it, sulphuretted hydrogen was given off. As to the suggestion that he made on the former occasion, that the Company required larger purifiers, the same figures as to the area stood, assuming the purifiers were 5 feet deep. Asked as to what was done in practice to prevent this nuisance from smell when the purifiers were cleaned out, he said that the only way was to properly use up the lime so that there would be no smell. Improperly used, lime could not be put into the atmosphere without creating a nuisance. If, in this case, the coal-gas purifiers were larger, no smell would be created. With respect to the water gas, the oil that came forward with the gas tended to destroy the purifying quality of the lime, because, when it became coated with the oil, it had no action upon the gas.

By Mr. D'EYNCOURT: He had not been to the works since July.

In cross-examination, witness was asked whether, as the percentage of water gas was largely reduced in proportion to the total output, this would reduce the nuisance; and he replied that it should do, and would do it thoroughly if the gas was cleaned of the oil which was carried forward by it. When he looked through the carbonizing book, it was not to find what the percentage of water gas had been, but chiefly to see whether the water gas was being used as carburetted water gas or blue water gas. In looking through the books, he did notice that at some periods—but only for short intervals—no water gas had been made. He did not know, however, that the percentage of water gas to the total output had been reduced by about one-half. Mr. Shoubridge certainly did not tell him that some of the purifying apparatus was used in a different way from what it had been the year before. He was told distinctly, in answer to a distinct question, that no alteration had been made in the method of working. Counsel pressed witness as to whether he had not made a mistake in substituting the word "method" for "apparatus;" but he emphatically replied in the negative. In the purification of water gas, it was always

necessary to use lime if they wished to take out the carbonic acid; and if the Company were not now using lime, they were not taking out the carbonic acid. If they did not do this, then they must use more oil as an enricher. He should say that this would be more costly to the Company; and it was certainly to the prejudice of the consumer as well. Turning to the question of coal-gas purification, witness was being cross-examined as to the method of working the purifiers, when

Mr. D'EYNCOURT asked Mr. Ryde to state shortly what the Company had done in this regard.

Mr. RYDE replied that they had altered the method of using the oxide boxes, so that each box in turn became No. 1. [To witness:] Is it not a fact that the boxes are working on the rotation system, so that each box becomes in turn the first?

Witness said that had been so for a considerable period. He did not know that this change was made just about the time these summonses were issued; but it was the method of working when he first inspected the plant in connection with this matter. He believed his first visit to the works was about Midsummer last year.

Mr. RYDE: Is it not a fact that we now take out of the coal-gas purifiers carbonate of lime, instead of sulphide?

Witness: The only sign I can judge by is this, that your works ——

Mr. D'EYNCOURT: Supposing that is being done?

Witness: If it is done, that is all we have ever asked for. The material cannot smell in the slightest if it is carbonate of lime.

Mr. RYDE: Well, now, the water gas has been reduced in quantity; and we have done away with the lime purifiers there. Does that satisfy you?

Witness: Yes, you can get no nuisance from the oxide of iron then. But there may be a nuisance in the manufacture, by the oil being carried out of the producer.

Mr. D'EYNCOURT: Put your own witnesses in the box, Mr. Ryde, and say what you have done, and then we can recall Mr. Stevenson.

In re-examination, witness was asked whether, with purifiers of the present capacity, any alteration in the method of working would be effective; and he replied that for summer work they might be, but, in his opinion, they were not of sufficient size for the winter work. If the Company were taking out the lime in the coal-gas boxes in the form of carbonate of lime, there would be no nuisance from the changing of the boxes. If it was true that this was being done, he could only suppose that those residents who were now complaining fancied the smells through their experience last year. It must be pure imagination.

Mr. RYDE, by permission, asked whether water gas did not get rid of naphthalene in the distributing-pipes.

Witness answered that was a moot point even among people who used water gas. Some said it did not.

Mr. *E. T. Pidwell*, one of the Council's sanitary inspectors, gave evidence as to certain dates on which he had noticed smells from the gas-works; and, subsequently,

Mr. RYDE remarked that they had now ear-marked the cause of the mischief. It appeared to be when they opened the coal-gas purifiers.

Sir *George Livesey*, the Chairman of the Company, examined by Mr. RYDE, said he had ascertained that, on the dates mentioned by the last witness, they were changing the coal-gas purifiers. It was not possible to change coal-gas purifiers, if lime was used, so as to create no nuisance at all. He had frequently smelt the changing of the coal-gas purifiers at the Old Kent Road works of the South Metropolitan Company when on the railway ½ or ¾ mile away. He said emphatically that this never injured the health of the workmen; but they could not change lime purifiers without giving off a certain amount of effluvia in the neighbourhood. Witness explained how the present high degree of purity for gas came about, and that to reduce the sulphur compounds to the prescribed point it was absolutely necessary to use lime. He would, if he could, give up the use of lime immediately. As to the statement that the purifiers were of too small an area, there was a greater area of purifiers at the Sydenham Gas-Works in proportion to the make than at any of the works of the South Metropolitan and Commercial Gas Companies. At the East Greenwich works, the former Company had an area of 8000 feet to purify over 5 million cubic feet of gas a day; while at Sydenham, to purify less than 5 million cubic feet a day, they had 10,560 feet. Therefore the Sydenham works were in this respect 25 per cent. in excess of East Greenwich. He might say further that the South Metropolitan Company had put up purifiers according to Newbigging's rule, and, finding them too big, actually reduced the size by nearly one-third. Taken to the interview with Mr. Stevenson, when Mr. Jones and Mr. Shoubridge were present, witness stated that he told Mr. Stevenson they would abolish the use of water gas ultimately as far as possible; but he did not say they would abolish it there and then, because that was impossible. They had been obliged to use a certain amount of carburetted water gas, simply because they could not get the illuminating power prescribed by Parliament from the coal. The percentage of water gas, however, had been reduced since the last hearing from 21·9 (say, 22) per cent. to 12·4 (say 12½) per cent.—a reduction of over 40 per cent. His reason for not liking water gas was that it cost more per 1000 cubic feet than coal gas; and they would certainly not use it if they could help it. As to whether it was desirable to use carburetted water gas if there were complaints of naphthalene in the consumers' pipes, he would give the same answer as Mr. Stevenson, that there were some who used water gas who said that it did cleanse the pipes from naphthalene, and there were others of the contrary opinion. Part of the 12·4 per cent. had been used by Mr. Shoubridge in order to sweep out the naphthalene from the pipes; but for this, the average would have fallen below 12·4 per cent. Last month there was great trouble from naphthalene—there were many hundred complaints every day; and the Engineer increased the make of water gas for a week or so. The complaints then ceased; but he (Sir George) did not commit himself to saying the increase in the water gas was the cause of their ceasing. Questioned again as to the size of the purifiers, witness stated that Mr. Stevenson was in the happy position of never having had the actual and responsible management of gas-works; but there was the fact that the Crystal Palace Company's purifying area was 25 per cent. greater than that of the South Metropolitan Company, who were under more stringent regulations in regard to sulphur. The purifiers at Sydenham were more than ample; and it would be folly and waste of money to extend them. Mr. H. E. Jones, who was a man of large and long experience, agreed with him in this. As to the water-gas purifiers, he did not think there ever had been any smell from them; but now that lime had been discontinued, there could be none.

Mr. D'EYNCOURT said he understood that, within the last six months, the carburetted water gas had been reduced by about 40 per cent., and lime had been discontinued in the water-gas purifiers.

Witness: And the system of working the coal-gas purifiers was changed about the time the complaints were made last year.

Mr. RYDE added that the alteration to the system now in vogue involved the changing of a number of purifiers on successive days; and this seemed to be the time that the complaints were made.

Witness further remarked that in changing the purifiers before that, the material was sometimes taken out and kept on the ground for a day or two. But since the alteration was made, whenever a purifier was changed, the lime was removed at once in covered carts.

Cross-examined, witness said he thought that the making of the alterations, when changing the method of working the purifiers, was the cause of the complaints last year. It was towards the end of September this year that they ceased to use lime in the water-gas purifiers. Although they had made more coal gas and less water gas, there had been a considerable reduction in the number of purifiers changed in the past twelve months, owing to the different system of working. In winter, they used more water-gas than in the summer, but not a larger percentage. In June, the consumption of gas was only one-third what it was in December; so that 15 per cent. in June would be only 5 per cent. in December. He could not conceive what caused the smell during the night time of which complaint was made by some of the witnesses; but he found that every smell in the neighbourhood of a gas-works was attributed to them. The times mentioned by the sanitary officer would be the times at which the coal-gas purifiers would be opened; and then a smell was unavoidable.

Mr. D'EYNCOURT: I understand that.

Further cross-examination did not elicit any fresh point; but Sir George took a convenient opportunity of saying that he considered it one of the hardships the Company laboured under that they were kept in the dark as to complaints. They ought to have been told at once.

Mr. *Stevenson*, recalled by his Worship, said he was satisfied with the changes made so far as the water gas was concerned; but with regard to the coal-gas purifiers, he was still of the same opinion as before. He must say that, in his experience, it was possible to take foul lime out of purifiers absolutely without smell. He had done it in his own case. Sir George Livesey was wrong in saying he had never managed a gas-works. He had just the same trouble, when he first left his father's office on finishing his pupilage, that there was now. Then he overcame it by increasing the number of purifiers; and, instead of turning out sulphide of lime, he turned out carbonate of lime.

Mr. RYDE: I suggest that Sir George Livesey is quite right, that the area of the purifiers at Sydenham is much greater in proportion to the make than in the case of the London Companies?

Witness: Assuming that to be so, then the management of the London Companies is much worse.

Have you verified the suggestion that was made to you on the last occasion, that the area of the purifiers here is larger in proportion to the make than in the case of the Gaslight and Coke, the South Metropolitan, and the Commercial Companies?—No.

Mr. *S. Y. Shoubridge*, the Engineer of the Crystal Palace Gas Company, corroborated Sir George Livesey's evidence. Examined on additional points, he said that the changes in the purifiers, to enable them to make the alteration in the mode of operation, were made from the 18th to the 25th of April last year. During those days, there would be vastly more smell than was usual in the ordinary changing of the purifiers. The alteration in the system of working enabled them to do with 49 less changes in the coal-gas purifiers in the year following the complaints, although the quantity of gas purified was 8¼ per cent. more. This meant doing away with the smell from about 1500 tons of lime. In the year prior to the complaints, the number of changes was 265; whereas in the year following there were only 216 changes. In addition to this, he also now used oxide as well as lime in the lime purifiers. He put a layer of oxide on the top of the lime, in order to absorb the moisture that fell from the lid condensation, and to take up the little sulphuretted hydrogen that could not be taken out after the gas was shut off before the change was made. This sulphuretted hydrogen was absorbed by the layer of oxide, and reduced the smell very much. Since July 2, when the summonses were heard, special precautions had been taken to remove the lime clean away from the works as fast as it was taken out of the purifiers. It was always carried away now on the same day. In regard to the water-gas purifiers, he had also reduced the number of changes in them considerably. By reducing the percentage of carbonic acid to be taken out by about 50 per cent., this had reduced the number of changes in the purifiers. In the six months prior to the summonses, there were fifty changes; while in the twelve months afterwards there were only sixty. They had now abandoned lime entirely in the water-gas purifiers. He also now pumped in a small percentage of air with the gas; and this had the effect of revivifying the oxide *in situ*, so that the purifiers never hardly had to be cleared out. Since they had altered the method of working, they had not taken a purifier out, whereas they formerly changed them once a week. As to the complaint received from Mr. Besant, he personally inquired into that. Mr. Besant was not at home at the time; and he pointed out to Mrs. Besant that, in a line with her house, and within 100 yards from it, there was a heap of burning ballast 30 feet in diameter, that it was the practise of the workmen before leaving at night to fire up the heap of burning clay, and that the smell coming off at the level of the windows of the house was the real cause of complaint. Mrs. Besant seemed quite satisfied; and they had heard nothing more from her husband. He had only received one other complaint; and he proved, to the satisfaction of the gentleman who made it, that it could not proceed from the gas-works. They had had no complaints from the Local Authority.

Mr. D'EYNCOURT: Supposing there has been an improvement since last spring, do you think the changes you have spoken of have been instrumental in effecting it?

Witness: Undoubtedly.

Cross-examined: The changes in the coal-gas purifiers were made on April 18 to 30, 1901, just about the time of these complaints. With regard to the water gas, the changes were made in September this year. There had been no need to open the purifiers at night time; and as to the complaints of smells during the night, the only explanation he could give was that they arose from burning ballast, as building was going on very rapidly now in the neighbourhood.

Mr. *H. E. Jones* was about to be called, when

Mr. D'EYNCOURT said he did not think he need trouble him. He had heard the evidence, both on the last occasion and on this. The impression on his mind on the last occasion was that there was a certain amount of smell and fumes which were preventible. He had just been informed by Mr. Shoubridge, and previously by the Chairman, that changes had been made; and Mr. Shoubridge said any improvement was owing to these changes. He had had before him a certain number of witnesses on this occasion; and two gentlemen—Mr. Pratt and Mr. Eamer—who both lived in close proximity to the works, said they had really noticed nothing to complain of since August. Dr. Harris said he had noticed it worse since then; but he lived at a greater distance. He (Mr. D'Eyncourt) thought himself there had been this improvement; and so far as he could judge (not being an expert, and only going by the evidence, and taking the average of the expert opinions), he thought something had been done—all that could reasonably be expected to be done for the practical working of the gas-works at present, if it was only kept up in the future. Therefore, as he adjourned this matter under sub-section 2 of the section under which the proceedings were taken, in order that the Company might adopt such means as might have been thought practicable, and they seemed to have done this, he felt that he could not on this occasion convict them under this section, because they seemed to have remedied the nuisance so far as could practically be done. If people put up houses in the neighbourhood of gas-works, they could not expect them to be the same as if they were on Snowdon. But what he did feel was this—that owing to the action of the Borough Council these matters had been remedied; and although, as he said now, the Company had acted within the statute in remedying them, he felt the Borough Council had been put to considerable expense in bringing this about. He thought that, although he did not propose to say that a non-conviction should carry costs, the Borough Council should have a certain amount of expenses paid in this matter. He did not know if Mr. Ryde proposed to make any offer to them; he (Mr. D'Eyncourt) rather suggested it as a friendly matter.

After a conference,

Mr. RYDE said they were told the Council had been put to considerable costs; and the Company offered them £60.

Mr. D'EYNCOURT: I think that sounds reasonable.

Mr. RYDE said he understood that his Worship had decided that the Company had adopted "the best practicable means" for abating the nuisance at present.

Mr. D'EYNCOURT: At present at all events, I think I am satisfied that I cannot convict you of not doing so.

Mr. RYDE: Shall I say it is not proved that we have not used "the best practicable means" of abating the nuisance?

Mr. D'EYNCOURT: That is so. I understand there has been an offer of £60. That is a great deal more costs, Mr. Leycester, than you would get here. It seems a reasonable offer; and therefore, under the circumstances, I shall mark the summons "withdrawn."

Alleged Theft by a Consumer from a Prepayment Meter.

At Norwich, last Saturday week, a man named Charles Pye was charged on remand with stealing 4s. 5d. from a slot gas-meter, the money of the British Gaslight Company, from his house between July and November. A meter was fixed in the prisoner's house on July 31, and up to Nov. 3 gas was consumed amounting to 5s. 10d. That night a police constable was on duty in Barrack Street; and, on account of a communication made to him by Mrs. Pye, he went to the prisoner's house. He told him his wife had said he had broken open the gas-meter; but this prisoner denied. Upon being searched, 4s. 5d. in bronze was found upon him; and the officer noticed that the drawer to the meter had been forced. After prisoner was arrested, the house was searched; and near a cupboard a file was discovered. On the handle of the file were some dents and brass marks; and the theory of the prosecution was that it was used to force the drawer. Police constable Dann stated that he was on duty in Barrack Street, when the prisoner's wife made a communication to him. Witness went to the house with her, and examined the meter, the lock of which had been wrenched off and the drawer and its contents removed. Pye was present; and witness said to him: "Your wife tells me you have just broken open the slot meter and taken the money from it." Prisoner replied: "I never did it." R. W. Woolnough, a meter inspector, in the employment of the Gas Company, said he went to the prisoner's house and inspected the meter, the index to which showed that 5s. 10d. had been passed into the drawer. No collection was made on behalf of the Company between July 31 and Nov. 3. In the ordinary course it would have been inspected, and the money collected, from about the 12th to the 15th of this month. Prisoner, who did not wish to say anything, was committed for trial at Quarter Sessions, and allowed bail, himself in £10 and two sureties of £5 each.

Carriage of Petroleum Spirit.

At the Oxford City Police Court on Friday, before the Mayor (Alderman Salter) and other Magistrates, an assistant in the laboratory at Christ Church, named Stephen E. Miller, was summoned for a contravention of the Railway Clauses Consolidation Act, 1845, in sending, on the 25th ult., to Paddington, a drum containing petroleum spirit which had a flashing-point below 32° Fahr., without distinctly marking the nature of the spirit outside the vessel, or giving notice to the Railway Company. Mr. Plummer prosecuted, and said the quantity of spirit so sent was about 5 gallons. I was fetched from the defendant's residence in Cowley Road, and was consigned to an address in Hatton Garden, London; the label bearing the words, "Petroleum, with care." The consignment note stated that it was mineral oil, inflammable, 73° to 150°. On arrival at the Paddington Goods Station, the drum was found to be leaking, and it was removed from the van to the platform. A porter took out the stopper in order to put the oil into a sound drum, when there was a flash, the vapour having caught alight from his handlamp, which was 6 or 8 feet away, and the flames roared up instantly to a height of 18 or 20 feet. They were fortunately subdued with tarpaulins. The contents of the drum were analyzed by Mr. Bird, the Company's Analytical Chemist at Swindon, and it was found that the ignition-point was below zero. It was one of the most dangerous spirits known—a species of benzoline. A number of witnesses were called; and Miller, in defence, said he was unaware of the flashing-point of the oil being so low, and he urged that it was the residue of petroleum from distillation, and was therefore simply petroleum. The Magistrate considered that the defendant, being a chemist, must have known that the oil was more inflammable than was described in the consignment note; but this being the first case of the kind, and as they did not believe a deliberate breach of the law was intended, they would inflict a fine of 20s. only, with 20s. 6d. costs.

The Fencing of Machinery.

At the South Shields Police Court, last Friday, the South Shields Gas Company were summoned, under the Factories and Workshops' Act, 1901, for not having a certain horizontal shaft securely fenced, in consequence of which neglect it was alleged that a man named John Smith suffered such bodily injury as to cause death. Mr. H. J. Wilson, one of His Majesty's Inspectors of Factories, conducted the prosecution; while Mr. C. W. Newlands appeared for the defendants. Robert Orbid, a fireman and labourer in the employ of the Company, said that one day in September last he was working near the engine-house when he heard shouts. On going inside, he found the engine running, and the man in charge being carried round with the shaft. Witness stopped the machine. There was no protection on the shaft at that time. The man was extricated, but died from the injuries he received. Mr. Wilson spoke to inspecting the engine in question that morning. He found it worked at 120 revolutions per minute. The shaft was about 3 feet from the ground, with a coupling on it which projected, and was about the most dangerous shaft that could possibly be imagined; and there was now a guard on it. In his experience, he had known a large number of accidents caused through shafts of that kind. For the defence, Mr. Newlands said that the Company were prepared to admit that it would have been better if there had been a guard over the shaft from the beginning, but after the accident they had done all they could. They did not wait for the Factory Inspector to instruct them as to what to do, but stopped the engine, and did not work it again until a guard was procured for the shaft. They did not desire to have their men subjected to the slightest danger. He did not wish to say anything about the deceased man, but he pointed out that, before his death, he stated, in answer to a question, that he should have stopped the engine before he did anything to it. It was not correct to say that the deceased was killed in consequence of the shaft being unprotected; for, as a matter of fact, his death was caused through his own negligence in not stopping the engine. He asked the Bench, under all the circumstances, to impose merely a nominal penalty. A man named James Hyde, employed at the works, spoke to having an interview with the injured man, who admitted to him that the accident was really his own fault, as he should have stopped the engine. The Bench imposed a fine of £5 and costs.

The Windsor Royal Gas Company were a few days ago fined £1 1s. and costs for allowing the fly-wheel of an engine to run without being fenced in.

Torquay Water-Works Extensions.—It was decided by the Torquay Town Council on Friday last to promote a Bill next session for, among other purposes, the construction of a reservoir and works for impounding the Trenchford or Beadon brook and the Kennett stream. The object of the measure is to give the Corporation the absolute right over the whole of the water running down the Trenchford Valley on Dartmoor. Already there is a reservoir belonging to the Corporation in the upper portion of the valley; but some months ago a scheme was under the consideration of the Teignmouth District Council, which, if it had been carried out, would have abstracted the water from a portion of the area. Although the present supply is adequate for the immediate needs of Torquay, it is felt advisable to make provision for an extension of the demand while it is still possible to do so without hindrance.

A Gas Contract Scandal in Japan.—The recent issue of the Japanese loan of £5,000,000 in London caused a Tokio correspondent of the "Journal des Débats" to caution capitalists to be on their guard in investing money in that country. He cites as his reason for doing so an incident which has taken place at Osaka, where the municipal authorities, wishing to have the town lighted by gas, and having no funds at their disposal, applied to certain Americans to carry out the work. These agreed to do so on condition of being granted a monopoly; and the municipal authorities, with the sanction of the Government, approved the proposal, which was duly and legally embodied in a contract. The preliminary works were commenced, and land was purchased. But operations have suddenly been stopped by the local authorities, who demanded a high percentage of the future profits, although nothing to this effect was stipulated in the contract; and they refused to allow the Company to make use of the streets for laying the mains unless their request was complied with. The action of the authorities has, it appears, been supported by the Government; and the matter will remain in suspension for a long time.

MISCELLANEOUS NEWS.

THE LONDON COUNTY COUNCIL AND GAS TESTING.

Gas Testing on Sundays and Bank Holidays.

At the Meeting of the London County Council to-day, the Public Control Committee will present the following report, dated the 7th inst., on the above subject: "On Oct. 7, 1902, the Council authorized us to arrange for the gas supplied by the Gaslight and Coke Company, the South Metropolitan Gas Company, and the Commercial Gas Company to be tested on Sundays and Bank Holidays, for a period of six months, and on the 14th of October additional relieving gas examiners were appointed by the Council for the purpose. The examiners attended on Sunday, the 2nd of November, at the various gas-testing places; but the Commercial Gas Company and the South Metropolitan Gas Company either refused the examiners admission or prevented the tests from being made, and tests were therefore only made at the testing-places of the Gaslight and Coke Company. As there was some doubt whether the action of the two Companies arose from a misapprehension, we have given them notice that the gas examiners would attend at the testing-places on Sunday, the 9th of November, for the purpose of testing the gas supplied. In the event of either of the Companies refusing to allow the tests to be made by the gas examiners, we are of opinion that steps should be at once taken, by injunction or otherwise, to prevent the Companies concerned from interfering with the gas examiners in the performance of their duties. We recommend 'That the Public Control Committee be authorized to take all necessary legal steps to secure the testing of gas by the gas examiners at the prescribed testing-places on Sundays.'"

In a subsequent report, dated the 14th inst., which stands upon the *agenda*, the Committee inform the Council that the examiners attended at the gas-testing places of the Commercial and South Metropolitan Gas Companies on Sunday, the 9th inst., and that the latter Company allowed the tests to be made, but that the former refused the gas examiners admission to the testing-place. This report is to be brought before the Council to-day with the view to its being considered as a matter of urgency.

HUDDERSFIELD GAS, ELECTRICITY, AND WATER.

Some Interesting Figures.

The annual report that the Mayor (Alderman Ernest Woodhead, M.A.) had to make to the Huddersfield County Borough Council on Monday last week was full of statistics which were rather out of the ordinary running in point of interest. Those that had been supplied to him by Mr. E. A. Harman, the Corporation Gas Engineer (as pointed out elsewhere in this issue), were remarkably so; and therefore we give this section of the address *in extenso*.

His Worship said: Continued satisfactory results have attended the operations of this department. For the year ending March 31, 1902, the income from all sources amounted to £94,365, and the gross profits to £21,934. This amount was disposed of as indicated under the head of finance. The outstanding balance of the £96,392 for reconstruction of the works should be paid off as circumstances permit, as the interest for it constitutes a heavy burden upon the resources of the department. The contributions to the relief of the rates since the purchase of the gas undertaking by the Corporation (after first deducting £3330 received from a rate-in-aid in the year 1896) have amounted to £138,624. The capital account is £322,655, which, with the reconstruction fund balance of £27,689, shows the total liability of the undertaking to be £350.344. The department pays a large sum annually for borough and district rates. During the past year, £4056 was thus paid, equivalent to more than 2d. in the pound upon the rateable value of the borough. The advantages of the incandescent light are increasingly appreciated by consumers, and an enormous development may still be anticipated. The Committee have proved conclusively that this system effects a considerable reduction in the gas consumption, while producing higher illuminating results. As all the gas street-lamps have been altered to the Welsbach system, the Committee have been enabled to make a large reduction in their charges to all the wards. This, while resulting in a lower revenue to the department, settles upon a satisfactory basis all the charges to the various districts. An inclusive price per lamp according to the number of burners has been agreed upon by all the districts and Committees concerned. The principal feature in connection with the department is the ever-increasing popularity of gas cooking and heating stoves. At the present time, many hundreds of these stoves are in use—a sufficient evidence of the great public convenience and utility they afford. The gas supplied for stoves and motive power in the last six years (the period during which gas-stoves have been so largely adopted) has grown as follows:—

Year ending March,	1896	62,176,800 cubic feet.
" " "	1902	183,642,200 "
Increase		121,465,400 "

The increased consumption under this heading has therefore been about 200 per cent. in the period named, which fully demonstrates the wisdom of the policy adopted by the Committee in conceding liberal terms for the hiring of stoves and fixing the same free of charge to the consumers. In the same period, the decrease in the amount of gas used for lighting purposes has been—

Year ending March,	1896	443,767,500 cubic feet.
" " "	1902	383,256,600 "
Decrease		60,510,900 "

This decrease is only 13 per cent. in the six years, notwithstanding the great economy effected by the incandescent lighting system. There must have been a large increase in the number of gas-burners used to produce this result. The penny-in-the-slot meter system is an important contributor to the revenue of the gas undertaking. At the last meeting of the Committee, the Gas Engineer reported that there were at the present time 7722 of these meters in use, and the demand increases. During the year, the sum collected from these meters amounted to £10,905, representing a weight of 24½ tons of copper. The coal carbonized in the year was 60,746 tons, as compared with 21,464 tons in 1873, the first whole year of Corporation control. The gas sold amounted to 567,617,000 cubic feet, compared with 560,473,800 cubic feet last year; showing an increase of 1¼ per cent. The Committee have granted considerable concessions to consumers by the abolition of the charges for fixing new meters, by undertaking the renewal of old service-pipes, and the free laying of new ones within the statutory limits. The Committee have placed on record their appreciation of the faithful services rendered to the department by Mr. Joe. Sykes, the Assistant Gas Manager, who died at the age of 49 years, after having been in the service of the department since the transfer of the undertaking in 1872; also of Mr. Thomas Stansfield, the lamp superintendent, who died during the year, at the age of 64 years, after many years' service.

In the portion of the address dealing specifically with financial matters appeared the following:—

The gas-works revenue account for the year ended March 31, after providing £14,826 for interest and redemption of the debt of the undertaking, shows a surplus of £7107, of which sum £3634 was transferred towards the cost of the reconstruction of works; leaving £27,688 11s. 11d. still outstanding on that account. The sum of £3473, balance of the revenue surplus, was carried to the credit of the borough fund in aid of the borough rate for the current year, which was relieved thereby to the extent of 2d. in the pound.

The net water-rental for the financial year ended March 31 last was £55,252—an increase of £1357. The revenue account showed a debit balance on the year's working of £12,403, as compared with a debit balance of £6057 last year. The deficiency is due to the inclusion of the item of interest on capital outlay, amounting to £12,446. This interest was capitalized until the period allowed by the Act of 1890 expired—viz., on July 25, 1900; but power has since been obtained in the Act of 1902 to continue to capitalize interest on current capital expenditure until the works in progress are completed. The item referred to above will therefore be transferred from revenue account to capital account, and the deficiency cleared. The balance of £9373 remaining in the depreciation account at March 31 last, is very inadequate for an undertaking with a capital outlay of over a million and a half. In view of the heavy charge in respect of interest which will fall on the undertaking immediately the reservoirs are completed, and bearing in mind the recommendations of the House of Commons Committee, a considerable annual addition should be made thereto in order to build up a fund which is commensurate with the requirements of such an extensive and necessary undertaking. The water-rental for the half year due Oct. 1, shows in respect of supply per meter a total of £7369, which is a decrease of £2164, and for domestic supply a total of £21,161—an increase of £416 over the corresponding period last year. The decrease in the supply per meter is explained by the consumption for trade purposes being exceptionally large during the corresponding period last year owing to the failure of other sources of supply through the drought.

The rental for electricity supply is still increasing. For the past year, it was £20,574, as compared with £17,017 for the previous year; giving an increase this year of £3556, equal to 21 per cent. The surplus on the year's working has been carried to depreciation and contingencies account, which shows a credit balance of £5509.

In giving some further information regarding the Electricity Department, his Worship said: The supply of electricity for lighting and power purposes shows substantial progress for the past year. There have been 131 consumers connected, with 12,124 8-candle power lamps, making the total consumers now supplied 1653, with lamps equal to 110,617 of 8-candle power. It is an interesting fact that there are more lamps fixed in Huddersfield per head of the population than in any other town in Great Britain excepting health resorts. The figures for some of the more important places are:—

Town.	Population.	Lamps per Head.	Town.	Population.	Lamps per Head.
Huddersfield	95,008	1·06	Preston	112,982	0·52
Manchester	543,903	0·81	Liverpool	685,276	0·52
Worcester	46,620	0·77	Glasgow	760,406	0·48
Bradford	279,809	0·74	Blackburn	127,527	0·48
Cheltenham	49,439	0·71	Bristol	328,842	0·45
Norwich	111,728	0·67	Sunderland	146,565	0·45
Nottingham	239,753	0·57	Sheffield	380,717	0·43
Halifax	104,933	0·55	Leeds	428,953	0·41
Hull	240,618	0·54	Wakefield	41,544	0·40
Bolton	168,205	0·53	Birmingham	522,182	0·29

The department had a gross profit last year of £10,851; and after paying interest and providing for the repayment of capital, placed the net balance of £2561 to reserve. It is anticipated that the financial results for the present year will show a considerable improvement upon those for last year.

FATALITY AT THE DARTFORD GAS-WORKS.

A Stoker Suffocated by Carbonic Acid Gas.

On Monday last week, an inquiry was held at Dartford into the circumstances attending the death of James Coles, a stoker at the Dartford Gas-Works, where he had been employed for eleven years.

While engaged in his duties, deceased had occasion to go down into the stokehole, and was shortly afterwards found there lifeless. An attempt was made to revive him by artificial respiration; but unfortunately it was ineffectual. The result of a medical examination was an expression of an opinion that Coles had succumbed to poisoning by carbonic acid gas. An extraordinary circumstance in connection with

the fatality was that, though the atmosphere was sufficiently charged with the gas to overpower Coles, the light he was using was not extinguished. Mr. F. W. Rapkin, the Manager of the works, stated that he had never heard of a similar mishap at a gas-works, and could not account for the occurrence, especially as an analysis by an expert showed only "8 parts of CO_2 per 10,000 of air by volume" in the stokehole. Mr. J. E. Harston, one of His Majesty's Inspectors of Factories, likewise commented upon the peculiar circumstances. As far as he could find out, there had never been a similar accident in the whole of the gas-works in this country; and what was more extraordinary was that, in the usual course, there was absolutely no danger from carbonic acid gas in such quantity as that stated. The subway was more than 6 feet high, and it had a top opening, giving perfect ventilation sufficient to clear away any appreciable quantity of the gas. It was almost incredib'e that so small a proportion of it should have caused death; and it was also remarkable that while the man lost his life, a light was not extinguished. As he had remarked, it was almost incredible that the fatality should have happened; but they had the doctor's evidence. The only recommendation he could make was that when a workman had occasion in future to go down into a stokehole observation should be kept by another workman, and that there should be kept on the premises a supply of oxygen, which was the most efficacious means of restoring persons suffering from poisoning by carbonic acid gas. It might be suggested that fans could be used to prevent the accumulation of the gas. But it was a question whether this would not increase the danger, by the down-draught causing larger quantities of the gas to fall; for, as they knew, carbonic acid gas was heavier than air. At any rate, he was not prepared to recommend this device. He mentioned that the Gas Company had shown every desire to facilitate the inquiry. A verdict of "Accidental death by poisoning by carbonic acid gas" was returned; the Coroner remarking that it was an extraordinary circumstance, as the Inspector had stated, but that the postmortem examination showed that death was due to this cause. He was informed that the Company would adopt the Inspector's suggestion as to observation, and keep a supply of oxygen at hand, in case of emergency.

COLONIAL GAS ASSOCIATION, LIMITED.

The Annual General Meeting of the Association was held last Tuesday, at the London Offices, Suffolk House, Laurence Pountney Lane, E.C.—Mr. SAMUEL SPENCER in the Chair.

The SECRETARY (Mr. Alfred J. Kingdon) read the notice convening the meeting; and the report and accounts—the chief features of which were published last week—were taken as read.

The CHAIRMAN said, in commencing the proceedings, he should like to introduce to the shareholders their new Director (Mr. Charles Hunt), and to ask them to join with the Board in the satisfaction they felt in having secured his services for the benefit of the Association. Mr. Hunt had been a shareholder from the formation of the concern; and to have the assistance of such an eminent Gas Engineer was, he (the Chairman) was satisfied, in the highest degree, a positive advantage. Doubtless the shareholders had noticed that this was the fourteenth annual meeting of the Association; and the Directors were pleased to state that the business was steadily improving, and he ventured to think it would continue to do so. During the past year, it had increased to the extent of 7 per cent.; and in the near future, he felt confident, this rate of progress would be extended. The shareholders would remember that last year he was hopeful that an increased dividend would have been declared this year; but, owing to various causes, especially the higher cost of coal (the expenditure had been £816 more in all) and the drought (which had been the worst experienced for forty years), the Directors had decided to recommend the same rate of dividend as last year—viz., 4 per cent. Although they had earned enough to pay a slightly increased percentage, it was deemed wiser to put to reserve fund some £400 and to increase the amount carried forward by £200. The Directors hoped the shareholders would approve the course taken. He might mention here, to show that the business was making progress, that they had connected 138 new consumers. The balance-sheet, in comparison with that of the previous year, showed that all the items were fairly satisfactory. Among other points of interest, the shareholders would be pleased to hear that the Hon. Mr. Bent, one of the Melbourne Directors, had been appointed Commissioner of Railways; and Mr. George Swinburne, the Managing-Director, had been elected a member of the Victorian State Parliament. These appointments could not fail to add to the confidence of the shareholders at home and in the Colony. The Managing-Director's report showed that he considered the prospects of the Association most favourable. He (the Chairman) had also to inform the shareholders that nearly the whole of the £22,000 debentures—about one-fourth of the ordinary shares—issued for ten years, were due for repayment at the end of this year; and the shareholders would be pleased to know that the Board had had no difficulty in renewing them for a further period of seven years. It would have given them more satisfaction to have placed them at a less rate of interest than 5 per cent.; but, under the circumstances, they thought they had done well in placing them at the same rate as before. By the time of the next issue, if it was then necessary to renew, the Directors hoped to be able to reduce the rate of interest, or, better still, be in a position to pay off part of the debentures. These debentures at par, he considered a sound and substantial investment. Since the last meeting, they had paid off the £2250 loan on the Bairnsdale works; and it was suggested by the Managing-Director that, as the working capital was rather small, £2000 to £3000 should now be raised in ordinary shares or debentures; and this the Directors had decided to consider. In conclusion, he might mention that the expenditure on capital account for the past year was chiefly for mains, services, and meters; and this would be fully appreciated when the shareholders remembered that 138 new consumers had been secured. They were working this year with cheaper coal; and the Directors anticipated a much better result in the profit for the current year. The amount spent during the past year on repairs and maintenance was rather more than usual; but this, the Directors believed, would not be objected to, as it showed their desire to keep the works and mains in an efficient condition. He then formally moved the adoption of the report and balance-sheet.

Mr. W. C. PARKINSON, in seconding the motion, said he remembered that last year they looked forward very hopefully to the then coming year. Their anticipations had been partially accomplished; and he thought the main reason that the accounts did not show even better results than they did was the great drought in Australia. They could hardly understand the extent to which this had affected every industry in Australia; but so it had been. However, he thought they were justified in the expressions which the Chairman had used in regard to the expectations that their property in Australia would continue to improve. The Directors were glad to see the honours that had been conferred upon Mr. Swinburne and the Hon. Thomas Bent. The Board looked forward very hopefully to the coming year.

Mr. R. H. DYER asked how the reserve fund was invested. He presumed the £1020 in the shares of the Brisbane Gas Company represented part of the fund; but the Directors did not show what they had done with the remainder. He suggested that they should have a reserve fund account, showing how it was invested. According to the accounts, it was quite possible it was simply a paper reserve, which, he for one, did not believe in. He agreed that the Association had done very well, considering the increased cost of coal and so on; but it did seem to him that the income was small for twelve gas-works.

Mr. PARKINSON said, as to Mr. Dyer's question regarding the reserve fund, if he would look on the credit side of the balance-sheet he would see that not only had they the money invested in the shares of the Brisbane Gas Company, but there were the natural assets of the Company, which he thought were entered at very much below value. Therefore, the part of the reserve fund that was not in the shares of the Brisbane Company was invested in their own business. A good deal of it was in coal, stoves, fittings, and other things that were absolutely necessary for their working; so that he thought Mr. Dyer's wishes were carried out in the matter.

The CHAIRMAN, referring to the point as to the income being comparatively small for twelve works, said that naturally, when they went into a place and took a small works, they hoped in time it would grow into a large one; but it was true some of their works had not made the progress that was expected twelve or fourteen years ago. The Association now had twelve works; and, with one exception, they were making good progress all round. In his opinion, they would in the future make better progress than in the past.

The motion was unanimously carried.

On the motion of the CHAIRMAN, seconded by Mr. A. GODWIN-HAMMACK, a dividend at the rate of 5 per cent. per annum (making 4 per cent. for the year) was declared.

Proposed by Mr. CHARLES HUNT, and seconded by Mr. M. CURRY, the Hon. Thomas Bent was re-elected a Director; and, on the motion of Mr. PARKINSON, seconded by Mr. F. G. PAINTER, Mr. Godwin-Hammack was also re-appointed.

The CHAIRMAN said the next business was the confirmation of the appointment of Mr. Hunt as a Director. Mr. Hunt had been professionally engaged as a Gas Engineer in the Midlands for many years; and now that he had come to live in London, it had given the Directors great satisfaction to welcome him to the Board. He (the Chairman) was personally very pleased to move that his appointment be confirmed.

Mr. PARKINSON, in seconding the motion, endorsed the Chairman's remarks.

The proposition having been unanimously carried,

Mr. HUNT acknowledged the confidence of the shareholders. He observed that he had been a shareholder from the commencement of the Association; and, knowing many of the places over which the business was spread, it appeared to him that there should be a good future for it. To secure that future, he would do all he could to second the efforts of his colleagues.

Moved by Mr. J. D. HAYTON, and seconded by Mr. GREGORY FISHER, Messrs. Lass, Wood, and Drew were re-elected Auditors.

A hearty vote of thanks was passed to the Chairman and Directors, on the motion of Mr. DYER, seconded by Mr. W. CHAFFER. Subsequently the officers were also thanked for their devotion to the interests of the Association; the resolution including special congratulations to Mr. Swinburne on his parliamentary honour.

Southport Gas.—Mr. John Booth, the Gas Engineer to the Southport Corporation, has been instructed by the Gas Committee to prepare a report on the Gas Improvement Company's tests of benzol enrichment, to shut down the oil-gas and benzol enrichment plants, and to make a week's test of the cost of manufacturing water gas and of enriching coal gas thereby. On the completion of these tests, all the oil-gas retorts, except those in perfect condition, will be shut down, and an exact test carried out of the make, cost, illuminating power, &c., of oil gas and of the cost of enriching coal gas by means thereof.

Extensions at the Bournemouth Gas-Works.—A third lift has been added to one of the gasholders at the Bournemouth Gas-Works, and has just been put to work. It has been designed and erected under the superintendence of Mr. F. S. Cripps, under whose superintendence practically the whole of the extensions at these important works have been carried out for more than twelve years. The lift just added runs free of the guide-framing, when up. Early this year, a set of four purifiers, with lifting apparatus, oxide, and lime sheds, &c., also designed and carried out by Mr. Cripps, were completed at the works. The purifiers are 30 feet square, and are without water lutes. The covers are of special design, and of the full size of the purifier, and are held down at the edges only—no central holding-down bolts being used. They are designed to resist a maximum working pressure of 36 inches. The rubber joint has proved perfectly sound.

PUBLIC LIGHTING QUESTION AT NUNEATON.

Gas versus Electricity.

The Urban District Council of Nuneaton recently decided to erect 21 arc lamps in the centre of the town; and notice was given to the Gas Company to terminate the existing contract. A new one was to be laid before the Highways Committee; but at the meeting last week the Committee reported that they had been in communication with the Company, but could not come to a satisfactory arrangement. They therefore submitted the whole matter to the Council for consideration. It appears that the Committee thought there would be a reduction by the Company of £142, as 42 lamps were to be displaced for the 21 arc lamps; but the reduction was only £80. Some lively discussion followed. Mr. Melly asked if the Company gave any reasons for the increase in the contract. Mr. Knox replied that he understood the Company had gone to considerable expense during the past twelve months. They had lighted the town throughout with Kern burners, and in the centre had erected special columns and lanterns. It was these which were to be displaced, and would not be required for any other part of the town, so that the Company would have them thrown on their hands. Continuing, Mr. Knox said the Company had prepared an estimate of the price the lamps would fetch, and also of the loss, and had charged the Council the extra amount as compensation. The new contract was for three years, so that this compensation extended over that period. Mr. Johnson remarked that he did not think it was fair for the Company to charge the ratepayers for their depreciation. Mr. Bates said the Council did not order the lamps, which were put up as specimens by the Company, who afterwards asked the Council to take them over. Mr. Coleman thought they should have new lamps at a reduced price if the Company were going to increase the charge for a smaller number of lamps. The Clerk then read the contract, which amounted to £962—working out at about £3 5s. per lamp. Some consternation was caused by this statement; Mr. Bates saying that the Electricity Committee were prepared to light the town for £3 per lamp. Mr. Coleman did not believe any local authority would be a party to such an agreement; and he thought the Council should not enter into it for three years. Mr. Mayer said that if they did not, the Company might make a fresh one. Ultimately the matter was referred back to the Committee. A motion to put out the lamps at midnight was lost.

THE GROWING BUSINESS IN LIGHTING-FITTINGS.

Falk, Stadelmann, & Co.'s New Premises.

It is only a natural sequence to the development of the gas and electric supply industries, that the demand for the fittings necessary for the lighting of all sorts and conditions of places should likewise expand, and to an extent having some relation to the growth of the maternal industries. The last few years have seen a remarkable change in the character of gas-fittings. The old styles, from which the manufacturers (whose notions were apparently petrified by long custom and connection) would not move so long as flat-flame burners were the order of the day, are fast disappearing. The incandescent burner has demanded altogether new patterns, and with the change has come a vast variety of chaste and elegant designs. These, in turn, have taken the fancy of the gas consumer, who in most cases is not long in seeing that the new lighting arrangement does not set well nor look well on the old fittings, and so gradually the antiquated water-slide chandelier and the brackets of Quakerish plainness are giving place to the ornamental fittings which the change to incandescent gas lighting has produced. Besides, the electric light has brought in its train a large demand for similar ornamental fittings. What these changes in the modes of artificial lighting mean to the fittings' manufacturer and supplier can best be judged by visiting their premises today, and comparing them with a few years since. We may refer, as an example, to the new premises of Messrs. Falk, Stadelmann and Co., Limited, of Farringdon Road. So great has been, in recent years, the new-born demand for the latest types of fittings—both metal and glass—for incandescent and electric light accessories of all descriptions, that no longer are the firm able to cope with the trade in the old premises in Farringdon Road; and, consequently, they have built for themselves tremendous sized warehouses at the back of the old offices and show-rooms. The new buildings cover within a little the extensive area that is bounded by Castle Street, Great Saffron Hill, and Clerkenwell Road. On this site, they have built the warehouses, wharves, and trade department which the large and varied business they now do in lighting requisites have made absolutely necessary, in order to enable them to execute the demands made upon them with promptness and efficiency. Apart from the adequate accommodation for the work that they have now secured, the firm may be congratulated on their prudence in erecting premises of a solidity and character that will withstand for long the ravages of time and the hard wear to which the nature of the work—the constant incoming and outgoing of goods—will expose them. The total area of the floors in the firm's premises is now 2¾ acres; and the staff numbers over 500.

But this moving of the warehouses and trade department into the new premises has enabled them to devote the old ones exclusively to show-room and office purposes; and customers will find now—whether they require gas, electric, or oil fittings and lamps—a large assortment of goods (instead of being closely packed so as to defy choice) disposed in an orderly manner about the extended rooms that will assist in a ready selection being made. The show-rooms on the first floor are now entirely devoted to all types of gas-fittings, glassware, burners, and mantles, prominent among which are, of course, the well-known and extensive range of goods that bear the firm's old trade title of "Veritas." While in these rooms, it was noticed that the stock includes an assortment of pendant incandescent lamps—there being just now, we understand, a demand for a type of incandescent gas-lamps resembling in outward appearance the electric light. Special fittings for these are made; and the various designs are very tasteful. The lamp that the firm have taken up in this line is that known as the "Glow." It is of simple construction, and is spoken of well as a shadowless and brilliant light-giver. The firm have also been giving attention, in connection with lamps of this kind, to the preservation of the metal part of the fittings; and among other things they have adopted an insulating joint with cover plate, which is to effectively insulate the ascending heat from the fitting, and so practically obviates discolouration. Another ingenious novelty that attracts attention is what is known as the "Municipal" bye-pass lever attachment. This is a simple device that is intended for fitting to street-lamps, in order to actuate the bye-pass lever, in place of the troublesome swaying chains, which are a nuisance to the lamplighter at dusk. The attachment merely consists of a tube split down its length so that it can, by means of a clamp, be fitted to the service-pipe of the lamp without disturbing the other fittings. At the top is an adjustable piece, so shaped that when, by means of an arm projecting from the clamp, the lamplighter turns the fitting to the left or right, it operates the bye-pass lever up or down, as the case may be, and so ignites or extinguishes the lamp with very little trouble or waste of time. Its use also enables the bottom of the lamp to be completely closed.

Passing down stairs to the ground floor, there were seen three large new show-rooms—this part of the premises having been previously occupied as stock-rooms and by the trade department. In one of the new show-rooms there is a splendid collection of electrical fittings of all kinds; and in the other two, lamps and auxiliary fittings for oil lighting. In every way, the important changes that have been effected should have satisfactory consequences for the firm and their customers; and the former are to be complimented on the fact that their business warrants the heavy expenditure entailed by the alterations.

QUESTION OF FORGED TRANSFERS.

The above subject, which has lately been discussed in our editorial columns, was dealt with by Mr. H. D. Ellis, the Secretary of the Commercial Gas Company, in a letter which appeared in "The Times" on Thursday. He began by pointing out that much misapprehension exists on the part of the public in regard to the power of a company to detect a forgery of a transfer of its stock, and then offered the following observations:—

1.—As to comparing the signature with another signature in the company's possession, this is a most fallacious test. To begin with, most people will at times vary their signatures more or less. When invited to sit down at a strange table or a desk, remove his glove, and write his name exactly upon an indicated spot with the sort of pen, perhaps, that he never uses, a person unaccustomed to the operation is pretty sure not to achieve a very good signature. Probably it will be very inferior to what a skilful forger will do for him. I have seen forgeries of signatures so admirable that the rightful proprietors of the signatures could at first scarcely believe they were forgeries. In fact, the forgery is sometimes better than the original.

2.—But it often happens that the company have no specimen signature in their possession. This is exactly what happened in the celebrated case of *Barton v. London and North-Western Railway Company*, out of which case the Forged Transfers Act had its origin. Barton, a holder of stock, died, leaving his son Thomas and his widow Ann executors of his will. Thomas forged Ann's signature to a transfer of the stock. The Company had no signature of Ann's in their possession, and they did not know, and could not know, anything about her. Her name had come on to the register of stockholders by operation of law, and her address, as furnished to the Company, was "care of Thomas Barton." It followed, of course, that, when the Company sent Ann a notice that a transfer purporting to be executed by her had been lodged for registration, Thomas took very good care that it did not reach her. It was the negligence of Ann in putting it out of the Company's power to communicate with her except through the medium of Thomas, and also in omitting for many years to ascertain whether dividend warrants were sent to Thomas, that enabled the latter to victimize innocent parties. Among these parties surely none was more innocent than the Company who had done all in their power; and it was never alleged against them that they could have done more.

3.—When a forgery is discovered in time, so that the Statute of Limitations does not come into operation, the purchaser will have his remedy against his broker, his broker against the jobber, and the jobber against the selling broker; so that we trace back to the party who (howsoever innocently) first set the forged document in circulation. And surely it would seem equitable that, if he cannot trace and recover against his own client, he should be the sufferer, just as any other commercial man who has to pay the penalty of having a rogue for a customer. I cannot help thinking that it would be possible for a little more care to be exercised by the broker in scrutinizing the execution of a transfer, and ensuring the identity of the transferrer; and I would suggest that, unless the attesting witness be the broker or his clerk (which should amount to a guarantee of the identity), a letter of inquiry should be addressed to the attesting witness.

4.—I would also suggest that companies should require joint holders of stock to furnish addresses wholly independent of each other, so that no communication addressed to one joint holder should have to pass through the hands of another joint holder. The common sense of the community would soon see and approve of such a regulation conceived in their own interests.

With regard to the suggestion of the correspondent of the 5th inst., whose letter was noticed in the "JOURNAL" last Tuesday, that the adoption of the Forged Transfers Act should be made compulsory, Mr. Ellis points out that this question of compulsion was one of the rocks upon which the Forged Transfers Bill No. 1 of 1890 went to pieces and was withdrawn; and he ventures to think that its introduction would be as impolitic now as it was then.

SOME HUMOURS OF STREET LIGHTING.

A correspondent who has just returned from the United States, after travelling therein for about nine months, has sent us the following humorous account of some street lighting experiences, which he assures us is founded on fact: "America marches with the times, and, as the Yankees say, a bit in front of it—that is, the more important cities do. Some of the small villages in the Southern and New England States, however, are fully as much behind the times as their larger neighbours are ahead of it. In these small outposts of civilization, life still drifts along in a very primitive manner. In one Southern village, where the old-time method of street lighting is still in vogue, the 'lamplighter' is an old negro woman. Her husband formerly held this position, and at his death it was given to his widow—more out of charity than anything else. There are some half-dozen lamp-posts in the place, and an average walker could cover the distance they occupy in a few minutes. But the old lady has a high view of the dignity due to her position, and she journeys from post to post in a diminutive cart, drawn by an equally diminutive pony. In a village in the New England States, the lighter is a one-legged man. It is a sight worth witnessing to see this man place his ladder against a post and then hop up it. As he walks from light to light, he balances the ladder over his shoulders by the aid of a loop of rope; his hands being occupied with his crutches. This same village was once the scene of a thrilling drama. It was the winter season, and the cold was intense. Coal was unobtainable, except at a prohibitive price; and wood was more than scarce. The fortitude of the lamplighter gave way, and he broke up his ladder and used it for firing. As a consequence, until another ladder could be obtained from the market town, the village languished in darkness. He himself, owing to his infirmity, was unable to swarm up the posts to light them, and no one else in the village was sufficiently interested in the matter to do this for him. The village fathers, probably holding the opinion that prevention is better than cure, purchased an iron ladder; and the official, who has long since repented of his misdeed and been forgiven, uses this to perform his duties."

Sales of Gas Stock.—Last Wednesday, Mr. H. Knowles (of Messrs. Bruton, Knowles, and Co.) carried out the instructions he had received from the Directors of the Gloucester Gas Company, and offered for sale £5000 of consolidated ordinary 5 per cent. stock of the Company. It was put up in £100 lots, which fetched from £113 10s. to £116 each; the total amount realized being £5701. At the Ipswich Gas Company's offices the next day, Messrs. Garrod, Turner, and Son sold £4500 of new ordinary "C" stock; being the balance of the additional capital which it was decided at the annual meeting in February to raise. It was offered in £10 lots, 440 of which were sold at £21 5s., and the rest at £21 7s. 6d. each; the total amount realized being £9733 15s.

ELECTRIC LIGHTING NOTES.

Launceston's Electric Lighting Scheme.

Considerable discussion took place at a meeting of the Launceston Town Council last Tuesday respecting the electric lighting scheme. It was decided that application should be made for a Provisional Order, and that arrangements should be made with Messrs. Crompton and Co. for giving effect to it. Several members objected to confining the electric lighting to a small area in the centre of the town. The Mayor (Mr. Shuter) explained that the light would be carried beyond the compulsory area if six persons in a district applied to be put on. Anyone residing within 250 feet of the mains was entitled to be supplied. Mr. Downing said the mains would be extended as time went on. There could at any time be an extension, by the erection of overhead wires. Mr. Powell thought it unreasonable to expect that the Electric Light Company would immediately lay down mains in the whole of the area for which the Gas Company now provided. The Town Clerk expressed the opinion that the length of the mains to be laid down in the first instance was about the same as in larger towns when they commenced operations, and that it would be in the interest of the Company to extend them as time went on. Mr. Hender thought the explanation entirely satisfactory. Two members, however, declined to vote for the resolution. Mr. Trood thought the matter was being unduly rushed through; and Mr. Treleaven said they had heard only one side of the question, and this was unfair and prejudicial to the interests of the town.

Pushing Electric Lighting in the West of England.

The electric lighting companies are once more busy in the West of England. Among the towns in which they are seeking to obtain a footing are Bideford and Falmouth. Falmouth, like Launceston, had what it regarded as a tempting offer from Messrs. Crompton and Co. This Company offered to deposit £200 as an earnest of their good intentions, to be forfeited if they failed to carry out the agreement. They then undertook to bear all the cost of an application for a Provisional Order, and, if this was granted, to put up electricity works and in connection with them a refuse destructor, and to pay the Corporation £50 a year rent. If the Corporation wished to acquire the undertaking, it might do so at the end of eight years. In discussing the offer on Thursday, some of the members urged that the Corporation ran no risk under such an agreement, and had everything to gain. One member said that the erection of the works and the laying of the mains would find employment which would be of great help to the working men in the town. Another contended that it would be an advantage to have competing illuminants, so that they could choose the better and cheaper for the streets; and he cynically added that it was no concern of theirs whether or not the undertaking was remunerative. Out of 14 members present at the meeting, 12 voted for the agreement. The Bideford Corporation on the same day looked very much less favourably on overtures from the

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 1337.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 15	10½	Alliance & Dublin 10 p.c.	18—19	..	5 10 6
100,000	10	,,	7½	Do. 7 p.c.	12½—13½	..	5 11 1
300,000	100	July 1	5	Australian 5 p.c. Deb. .	100—102	..	4 18 0
200,000	5	Nov. 13	6½	Bombay, Ltd. . . .	5¾—6*	−¼	5 8 4
40,000	5	,,	6½	Do. New, £4 paid	4—4½*	..	5 15 6
380,000	Stk.	Aug. 14	12	Brentford Consolidated	248—253	..	4 14 10
270,000	,,	,,	9	Do. New . . .	180—185	..	4 17 3
50,000	,,	,,	5	Do. 5 p.c. Pref. .	125—130	..	3 16 11
206,250	,,	June 12	4	Do. 4 p.c. Deb. .	111—114	..	3 10 2
220,000	Stk.	Sept. 11	1[illegible]	Brighton & Hove Orig.	207—212	..	5 1 5
246,320	,,	,,	[illegible]	Do. A. Ord. Stk. .	152—157	..	4 18 9
460,000	20	Sept. 26	10	British.	40—41	+½	4 14 7
50,000	10	Aug. 14	12	Bromley, Ord. 10 p.c. .	22—24	..	5 0 0
82,850	10	,,	9	Do. 7 p.c. . . .	18—20	..	4 10 0
500,000	10	Oct 15	7	Buenos Ayres (New) Ltd.	10—10½	..	6 13 4
250,000	Stk.	June 24	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
150,000	20	July 11	8½	Cagliari, Ltd. . . .	21—23	..	7 3 6
100,000	10	Sept. 26	10	Cape Town & Dis., Ltd.	14½—15½	..	6 9 0
50,000	50	Nov. 3	6	Do. 6 p.c. 1st Mort.	53—55	..	5 9 1
550,000	Stk.	Oct. 15	12½	Commercial Old Stock	260—265		4 14 4
251,875	,,	,,	5½	Do. New do. .	200—205	..	4 12 8
271,875	,,	June 12	4½	Do. 4½ p.c. Deb.	130—134	..	3 7 2
800,000	Stk.	May 28	8†	Continental Union, Ltd.	138—143	.	5 11 11
200,000	,,	,,	7	Do. 7 p.c. Pref.	140—145	+2	4 16 7
575,000	Stk.	Aug. 28	5½	Crystal Palace Ord. 5 p.c.	118—123	..	4 6 8
60,000	,,	,,	5	Do. 5 p.c. Pref. .	120—125	..	4 0 0
106,158	,,	July 11	5	Do. 5 p.c. Deb. Stk.	138—141	..	3 10 11
486,090	10	July 30	10½	European, Ltd. . . .	17½—18½	..	5 13 6
354,060	10	,,	10½	Do. £7 10s. paid	13—14	..	5 12 6
15,243,200	Stk.	Aug. 14	4	Gas-light and Coke: 4 p.c. Ord. . .	88—90	..	4 8 11
2,600,000	,,	,,	3½	3½ p.c. max. .	88—90	..	3 17 9
3,799,735	,,	,,	4	4 p.c. Con. Pref.	109—111	..	3 12 1
4,193,975	,,	June 12	3	3 p.c. Con. Deb.	92—94	..	3 3 10
70,000	10	Oct 30	8	Hongkong & China, Ltd.	14½—15½	..	5 3 3
3,800,000	Stk.	Nov. 13	10	Imperial Continental .	200—203*	..	4 18 6
473,600	Stk.	Aug. 14	3½	Do. 3½ p.c. Deb. Red.	99—101	..	3 9 4
561,000	Stk.	Aug. 28	10	Liverpool United A	223—226	−2½	4 8 6
718,100	,,	,,	7	Do. do. B .	165—167	..	4 3 10
306,083	,,	June 24	4	Do. do. Deb. Stk.	116—118	..	3 7 10
75,000	5	June 12	5	Malta & Medn., Ltd. .	4¼—4⅜	..	5 5 3
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	104—108	..	4 12 7
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	102—104	..	4 6 7
541,920	20	Nov. 13	2½	Monte Video, Ltd. . .	9—10*	+½	7 0 0
1,515,892	Stk.	Aug. 8	4½	Newc'tle & G'tesh'd Con.	104—105	..	4 5 9
346,855	Stk.	July 4	3½	Do. 3½ p.c. Deb.	99—100	..	3 10 0
300,000	Stk.	—	8	Oriental, Ltd. . . .	—	..	—
60,000	5	Sept. 26	7	Ottoman, Ltd. . . .	6¾—7	..	5 0 0
					* Ex div.		

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
851,070	10	Oct. 15	7	River Plate Ord. . .	10—10½	..	6 13 4
300,000	Stk.	June 24	4	Do. 4 p.c. Deb..	92—94	..	4 5 1
250,000	10	Sept. 26	8	San Paulo, Ltd.. . .	11⅝—12½	..	6 8 0
135,000	Stk.	Sept. 11	10	Sheffield A	235—237	−1	4 4 5
209,984	,,	,,	10	Do. B	235—237	−1	4 4 5
523,498	,,	,,	10	Do. C	233—235	−1	4 5 1
6,000,000	Stk.	Aug. 14	5⅓	South Met., 4 p.c. Ord.	121—124	..	4 6 0
1,700,000	,,	July 11	3	Do. 3 p.c. Deb. . .	91—93	..	3 4 6
380,940	Stk.	Nov. 13	5	Southampton Ord. . .	103—107*	+3½	4 13 6
87,950	,,	July 11	4	Do. 4 p.c. Deb.	102—105	..	3 16 2
120,000	Stk.	Aug. 28	6	Tottenham and Edmonton: A. 5 p.c.	118—123	..	4 17 7
300,520	,,	,,	4½	B. 3½ p.c.	92—95	..	4 14 9
182,380	10	Jan. 16	5	Tuscan, Ltd.. . . .	7—8	..	6 5 0
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	96—98	..	5 2 0
230,000	5	Aug. 14	5½	West Ham, 10 p.c. . .	10—11	..	4 6 4
172,000	10	,,	6½	Do. 7 p.c. . .	13½—14½	..	4 9 8
				WATER COMPANIES.			
780,599	Stk.	June 24	11½	Chelsea, Ord. . .	310—320	+10	3 11 11
150,000	,,	,,	5	Do. 5 p.c. Pref. .	152—157	..	3 3 8
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	140—143	..	3 2 11
175,785	,,	Sept. 26	4½	Do. 4½ p.c. Deb. .	137—142	..	3 3 5
1,720,560	Stk.	Oct. 15	8	East London, Ord.. .	213—218	+2	3 13 5
654,740	,,	June 12	4½	Do. 4½ p.c. Deb. .	142—147	..	3 1 3
1,282,943	,,	,,	3	Do. 3 p.c. Deb. .	97—99	..	3 0 7
700,000	50		8	Grand Junction: 10 p.c. max..	110—115	..	3 9 7
310,000	Stk.	Sept. 26	4	4 p.c. Deb..	125—130	..	3 1 7
708,000	Stk.	Aug. 14	14	Kent	290—300	+5	4 13 4
160,000	,,	,,	7	Do. New, 7 p.c. max..	195—205	..	3 8 4
1,043,800	100	June 24	11	Lambeth, 10 p.c. max..	297—302	+4½	3 12 10
406,200	100	,,	8½	Do. 7½ p.c. max..	210—220	..	3 17 3
350,000	Stk.	Sept. 26	4	Do. 4 p.c. Deb..	125—130	..	3 1 7
500,000	100	Aug. 14	12⅝	New River, New Shares	385—395	..	3 4 9
1,000,000	Stk.	July 30	4	Do. 4 p.c. Deb..	125—130	..	3 1 7
902,300	Stk.	June 12	7	South-wark and Vauxhall: Ord. . . .	195—200	..	3 10 0
126 500	100	,,	7	7½ p.c. max.	180—185	..	3 15 8
489,200	Stk.	,,	5	5 p.c. Pref.	153—156	..	3 4 1
1,019,585	,,	Oct. 15	4	4 p.c. A Deb.	123—128	..	3 2 6
1,155,066	Stk.	June 12	10	West Middlesex. . .	275—285	+5	3 10 2
200,000	,,	,,	4½	Do. 4½ p.c. Deb. .	139—144	..	3 2 6
200,000	,,	Sept. 11	3	Do. 3 p.c. Deb. .	95—97	..	3 1 10
					* Ex div.		

† Next dividend will be at this rate.

Electric Supply Corporation, who purpose applying for a Provisional Order. Several members thought the Town Council should provide electricity works if they were needed. Before assent is given to the proposal, the matter is to be carefully considered, with a view to deciding whether it will be worth while for the Town Council to go into the business.

Electricity Supply at Plymouth.

A series of returns relating to the electricity undertaking was presented to the Plymouth Corporation yesterday week. One showed that in the quarter ended Sept. 30 last the total number of units used was 278,621, compared with 170,331 in the corresponding quarter of last year. Of this quantity, however, 208,414 units were for the tramways, and only 48,151 units for private lighting; the balance being made up of 21,650 units for arc lighting and 406 units miscellaneous. The estimated receipts are put at £3913, against £2724 last year. Three-fourths of the revenue is derived from the tramways and the public lighting; the anticipated receipts from private consumers being £902, which, however, is £218 more than in the corresponding period of last year. Another statement by the Engineer shows that for the year ended March last the estimated income was £11,060, and the expenditure £8317; showing a gross profit of £2743. As a matter of fact, the income was £13,323, and the expenditure £8487; leaving a gross profit of £4836. A considerable proportion of the increased income was due to the advance in the price charged for electricity for public lighting and for the working of the Corporation tramcars. As the result of this increase, the income under these heads amounted to nearly £1500 more than the estimate. According to a third statement, the cost of the current supplied in the year 1901-2 (exclusive of capital charges) was 2·19d. per unit, compared with 2·79d. per unit in 1900-1. An average of the cost per unit in 106 local authorities was 2·33d. Mr. S. J. Page subjected these figures to caustic criticism. He pointed out that in the accounts of the Committee no allowance had been made for the repayment of the balance due to the bank, for which purpose £700 ought to have been set aside. The Committee had also evaded responsibility in other directions, and had made no provision for depreciation or renewals. Apart from the question of depreciation, the undertaking showed a loss of £600, instead of the profit of £349 which the Committee claimed. As to the cost of production, if comparison were made with undertakings doing a similar business, it would be found that the cost per unit in Plymouth was higher than the average of other towns. Alderman Radford, the Chairman of the Committee, contended that, however the comparison with other towns was made, it was still not unfavourable to Plymouth. As to the depreciation account, in a new undertaking the items of depreciation, renewals, and repairs must necessarily be small. Mr. Debnam said that the position of the concern would appear more favourable but for the fact that they had a quantity of machinery in excess of their present requirements, and all of which would certainly be required in the near future.

WEST MIDDLESEX WATER-WORKS COMPANY.

The Half-Yearly General Meeting was held at the Company's Office, Marylebone Road, last Tuesday—Mr. E. Boulnois, M.P., presiding.

The Secretary (Mr. F. H. Wybroo) read the notice calling the meeting, and subsequently the report of the Auditors, which stated that the capital of the Company to September 30 was £1,986,228, including £47,705 received during the past half year; and the total expenditure on works amounted to £1,959,088, including £4552 expended during the half year. The revenue for the six months ended Michaelmas last was £154,317; showing an increase on that of the corresponding period of last year of £3919. The water-rental received during the half year was £140,177; and the balance to the credit of the dividend and interest account was £67,262.

The Chairman stated that all the works had been kept up in a thoroughly efficient condition. It had always been the aim of the Directors to see that everything should be well up to date, and that all the machinery should be of the latest description and be maintained at the highest point of efficiency. In the report which was issued annually by the Local Government Board, he noticed that page after page contained encomiums, he might say, upon the manner in which the Water Companies generally in London, and their Company in particular, were carrying out their duties. They had now—and this had been their aim for many years—a very large storage capacity, with which he thought they might be well content for some time. This had been a feature which the Local Government Board and others had always urged upon the Companies; and looking at the report of the Local Government Board, he thought it would be seen how well they had responded in this direction. The number of new supplies laid on in the half year was 683, and the total was now 89,105. The business of the Company was still extending. The area supplied by them was by no means covered with houses yet; but those which were springing up constantly in all directions, and especially in the north, chiefly consisted of a smaller class of houses which were supplied with water at less than cost price. Those who occupied these houses had no reason to complain of the quality of the supply, or of the quantity, which was unlimited; and they had no reason to complain of the price which they paid—these houses being supplied at a cost to the individual of something like 1d. per week per head. The 30-inch main from Brompton Road to the Grand Junction Company's reservoir at Campden Hill, which their Company were required by the Local Government Board to lay, under the general scheme of intercommunication between the works of the Metropolitan Water Companies, had been completed. This scheme, which was only sanctioned by the Local Government Board on July 13 last, would shortly be fully carried out, and then he thought he was justified in saying that the possibility of any part of London being short of water at any period of the year was extremely remote. The London Water Bill was, as the proprietors were aware, before a Joint Committee of the Houses of Lords and Commons for a long time in the

The

"Parkinson" Cooker

CROWN PATTERN.

PARKINSON AND W. & B. COWAN, LTD.,
LONDON, EDINBURGH, BIRMINGHAM,
MANCHESTER, SYDNEY, N.S.W.

summer; and the Directors in their report expressed the hope, now that the Bill was before the Committee of the House of Commons itself, that some further alterations might be made in it before it was finally passed. He could tell the proprietors no more than they themselves knew as to the position in which the Bill stood. They read in the papers that it was to be taken before the present session closed. They could gauge for themselves how far it was possible for the Government, in the present state of business in the House of Commons, to pass a Bill which involved the payment of possibly between £40,000,000 and £50,000,000—the National Debt of some states. It was said out of doors that he was prejudiced; and he was to a certain extent. But he hoped that he had an open mind on public matters. He had, however, always held the opinion—and he still held it—that nobody would be one whit the better by the passing of the Bill, if it did pass. On the contrary, he thought—and there were others who thought with him, and who knew something about the matter, having been behind the scenes for many years—that the consumer and the ratepayer must suffer. The great fight over the Bill in the Committee in the House of Commons would be with regard to the constitution of the new Board which was to take over the Water Companies. This was a matter with which, he thought, the latter had no real concern; but the new Board must necessarily be formed of very raw material, for no Director of any London Water Company, whatever his experience or capabilities, could possibly be elected a member of the new Board if the Bill passed in its present form. He therefore thought he was justified in saying that such a Board as was contemplated must enter upon its duties without a particle of experience or knowledge of water affairs in the Metropolis. His colleagues and he had always held that the great blot on the Government Bill was the fixing of what was called an "appointed day," which—contrary to all usage, all practice in these matters, and, he thought, contrary to all justice—made the undertaking pass to the purchaser before even the price to be paid for it was ascertained. He hoped that some further consideration would be given by the Government to this point, and that some amelioration of the conditions which he had mentioned would be made in this direction. The Engineer of the Company, Mr. M. W. Hervey, had tendered his resignation to the Directors, and it was to take effect at Christmas next. The Board had received Mr. Hervey's resignation with much regret, which he was sure would be shared in by the proprietors. It was impossible to speak in too high terms of the services which had been rendered to the Company by Mr. Hervey, and the Directors wished him all happiness and prosperity in the future. To fill the vacant position, they had appointed Mr. Henry Fillmer Rutter, who had been one of the Company's Assistant-Engineers for fourteen years. They had the utmost confidence in Mr. Rutter's ability, and they believed in appointing him that he would closely follow in the footsteps of his predecessor. With reference to the accounts, an increase of about £4000 was shown in the past half-year's profit as compared with that of the corresponding period last year. He thought that this was a highly satisfactory state of affairs. They could divide no more than the statutory dividend; but it was a gratification to know that this was well secured, and that the Company were also advancing in prosperity. He was only sorry that the consumer could not continue to share in the prosperity of the Company's undertaking; but Parliament, having given him a pecuniary interest, shortly afterwards deprived him of this benefit by establishing the Chamberlain's fund—a scheme which did not do the slightest good to any individual, as far as he could see, or which was not likely to do any good for a century to come. Parliament had forced the Company, by establishing this fund, to pay a sum which must gradually increase from year to year, for what was called a sinking fund to redeem the undertaking; thus preventing the consumers getting a rebate and benefiting by the prosperity of the undertaking. The Directors would use their best endeavours to keep the affairs of the Company in a prosperous condition. Having warmly testified to the services of the staff, he concluded by moving the adoption of the report and accounts and of the report of the Company's Auditors thereon.

The DEPUTY-CHAIRMAN (Mr. Jackson Hunt) seconded the motion.

A SHAREHOLDER inquired whether the Chamberlain's fund would be put to the credit of the Water Companies in the event of the Government buying out their undertakings, or whether the Government would take it.

The CHAIRMAN said he feared that it would not be put to the credit of the Companies. He thought it ought to be, because it was established at a time, a good many years ago, when purchase was imminent, and because it was imminent. That it should have been kept up as it had been was, he thought, hardly fair to the Companies. He then put the motion, which was carried unanimously. Continuing, he proposed the declaration of a dividend on the consolidated stock for the half year ended Sept. 30 at the rate of 10 per cent. per annum, payable, less income-tax, on and after Jan. 5 next.

The DEPUTY-CHAIRMAN seconded the resolution, which was carried unanimously; and a vote of thanks to the Chairman and Directors brought the meeting to a close.

NORTH WARWICKSHIRE WATER ARBITRATION.

An arbitration to assess the price to be paid to the North Warwickshire Water Company by the Coventry Corporation for the compulsory sale to them of a portion of the Company's undertaking, took place last month at the Surveyors' Institute.

Mr. WALTER HUNTER was Arbitrator for the Company, and Mr. CHARLES HAWKSLEY for the Corporation. Sir FREDERICK BRAMWELL acted as Umpire. Mr. BALFOUR BROWNE, K.C., Mr. WEDDERBURN, K.C., and Mr. F. N. KEEN appeared for the Company; and Mr. J. D FITZGERALD, K.C., and Mr. LLOYD represented the Corporation.

Mr. BALFOUR BROWNE, in opening the proceedings, stated that the

"Now is the winter of our
"discontent made glorious by . . . . .

the
use
of

Richmond's

"Sunshine"

" "

LONDON,
WARRINGTON,
STRATFORD,
ETC., ETC.

Company was formed under an Act passed in 1898, which was opposed by the Coventry Corporation. They contended that a portion of the district the Company sought to supply was really an overflow population of Coventry, and that probably before very long the districts would be taken into the city and become part of Coventry. The Company said that this did not give the Corporation *locus standi* to oppose the Bill at all; but they got *locus standi* to oppose. Negotiations then took place between the Company and the Corporation, and a clause was inserted in the Act. It was in respect to this clause that they were now sitting to determine the price to be paid. When the clause was arranged, the Corporation withdrew all further opposition to the Bill, and the Act passed authorizing the Company to supply considerable districts named Foleshill and Stoke, near Coventry, which the Corporation at that time rightly thought would probably be added to the borough, because, since the Act, by means of a Provisional Order, these two districts had been taken away from the county and added to the county borough. In regard to the clause alluded to, its form followed, as far as possible; the usual form of compulsory purchase of an undertaking; but in this case, it was not the compulsory purchase of the whole concern, which might have been fair, but the compulsory purchase of only a part of the undertaking. All the conditions precedent to the purchase had been fulfilled. By a Local Government Provisional Order of 1899, portions of the parishes of Foleshill and Stoke were annexed to the city of Coventry, The calculations as to the value would all begin, so far as the future was concerned, from the date of the intention to purchase. Counsel described the areas of supply and the works possessed by the Company. There was a complete pumping-station at Corley, with reservoirs and the necessary works and mains leading from there to the south and along towards the east into a portion of the added area. Besides this, there was a bore-hole at Keresley, with a temporary engine and pumping plant. Both Foleshill and Stoke supported the Bill; and the condition was put upon them in regard to both. When the Act was passed, they set to work at once to make the works in order to carry out their bargain with the two places; and they supplied the districts within twelve months of the passing of the Act. The real meaning of their Act, although they got a large area besides, was to supply these populous districts. The Corporation had put hard terms upon them; it being provided that the Arbitrators or Umpire to be appointed in pursuance of the Lands Clauses Acts should not, in determining the price to be paid by the Corporation, make any allowance for, or in respect of, the value of the portion of the undertaking to be acquired by them to accrue after the year 1910. Their whole value was prospective value. The hardship came in in taking away the power from this tribunal to look at the profit beyond 1910. In ordinary cases, some multiplier was applied which gave the value in perpetuity; but in this particular instance, they were limited to 1910. What they had done was, first, to take as the basis the undertaking in this area and to see what profits they would have down to 1910, and there, of course, the whole difficulty of the arbitration came in. They had calculated what had been the increase in the number of consumers and the rateable value of the houses attached to their pipes, and they found that they were just round the corner, and turning losses into profits. As to their scheme of valuation, they found that there had been a certain increase going on year by year; and they had assumed that this would be continued at the rate of 10 per cent. per annum for the years that were still to elapse before 1910. This was practically the same percentage of increase that had taken place in preceding years. There had been a considerable increase in rateable value in the added areas, not only by the erection of new houses, but also by additions to existing tenements. It was upon the basis of rateable value that they charged; but in future they must go upon the increase of rateable value, because that was the basis of charges they made. With regard to working expenses, they were in this difficulty—that the working expenses of a new concern were in many respects abnormally high, and therefore it meant that there was to be a considerable adjustment of the accounts. There appeared to be a satisfactory future for the Company in the added area. The Corporation were taking the really valuable part of their business, and leaving them with a very serious obligation to supply the remainder; and they might supply at a dead loss until 1910. Having dealt minutely with the figures, Counsel concluded by asking for £75,371.

Mr. *Joseph Ashley* stated that the annexed portion of Foleshill was a growing centre, as a considerable number of new industries had been introduced in recent years. He considered that the rateable value of the houses in the added area was likely to increase during the next eight years at the rate of 10 per cent. per annum.

Mr. *Thos. Scott Gossage*, Mr. *S. Edwards*, Mr. *W. B. Keen*, and other witnesses also gave evidence.

Replying to a request of Mr. FITZGERALD (who said he did not understand what the objection was) that he should produce the contract under which certain works were made,

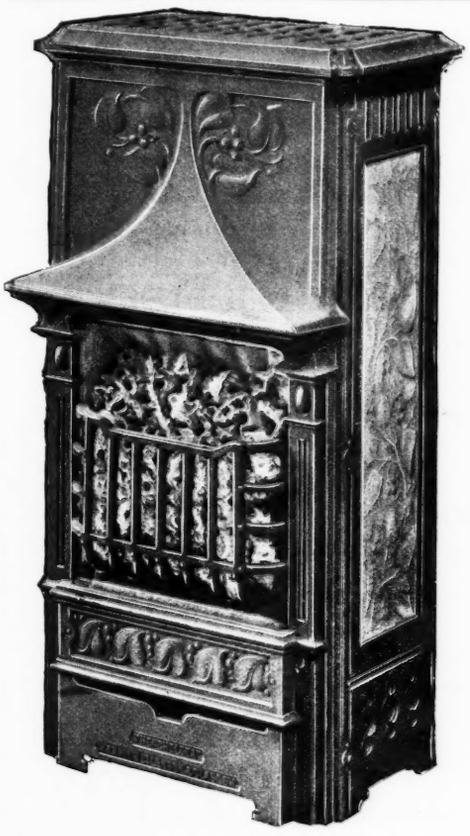
Mr. BALFOUR BROWNE declined to do so. It was not a question, he said, of what the Corporation took over, but a question of what damage was done to the Company. He was not claiming as if the Corporation had taken over the entire undertaking, but for damage done by the taking away of two districts from which revenue was derived.

The UMPIRE intimated that the Arbitrators would consult with him later on.

On the resumption of the proceedings the following day,

The UMPIRE said that, as regarded the question of the production of the contract asked for by Mr. Fitzgerald on the previous day, the Arbitrators had considered the matter, and had come to a conclusion upon it. They had asked him to state their conclusion. He was requested to say that they agreed that Mr. Fitzgerald was not entitled, under the present condition of things, to have an inspection of the contract. Should reference be made to it, however, in the course of the plaintiff's case, their determination might have to be altered.

Mr. FITZGERALD remarked that, when the question came up again, the matter might be referred to.



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Mr. *Keen*, recalled, gave further evidence respecting figures taken from the valuation books.

Mr. *Joseph Quick* said he had held the appointment of Engineer to the North Warwickshire Water Company since its formation, and designed and carried out the works as they existed to-day, which he briefly described. He, of course, expected an increased demand for water in the added area in the future; that was by far the most valuable part of the district given to the Company in 1898. He considered that provision should be made of 15 gallons per day per head of the population in the future. The number of houses in the added area in 1910, according to the statistical notice put in, would be 4634; and adopting the figure of five persons in a house, this would give a population to be supplied in the added area in 1910 of 23,170. The quantity of water then required per day would be about 350,000 gallons. He had based his calculation upon the ordinary principle of capitalizing the present net revenue, and also the prospective net revenue limited by the year 1910. In each case, he had discounted the revenue of each year back to the present time. With regard to some questions, he relied upon the statistical tables prepared and given in evidence by Mr. Ashley and Mr. Keen. If the works were in perfect order, he estimated the value of the revenue which he believed would be earned from the present year to 1910 at £77,716. This would be the value of a complete works, leaving out any question of compulsory sale. [A table showing the value of prospective profits of the Company's undertaking in the added area to 1910 was handed in. This showed the gross water-rental, working expenses, profit on water, annual increase, annual increase capitalized at 33¾ years' purchase, &c.] If the Company had not got in 1898 what was now the added district, he did not hesitate to say that they would not have gone on with the Bill. If this district were taken away, the Company would have pumps, machinery, and mains which would be of comparatively little use.

In cross-examination by Mr. FITZGERALD, witness said the clause in the Bill of 1898 which had been referred to, under which the Corporation of Coventry obtained powers to purchase a portion of the undertaking if they extended their boundaries within seven years, was inserted by agreement; there being a compromise at the time. He believed the Provisional Order for extending the boundaries of Coventry was promoted in November, 1898, but was not sure. The Order was confirmed in the session of 1899, and came into force the following November. Subsequently, in 1900 and in 1902, the Company again asked for extensions of their district and for further works.

Mr. FITZGERALD: Supposing the whole of your undertaking, which at the present moment is not earning any dividend, was being transferred, would you ask more for its prospective increase than 33¾ years' purchase?

Witness: We should calculate upon precisely the same basis.

And, therefore, if you are handing over the whole undertaking, with pumping-stations, wells, reservoirs, all the mains, and everything, you would calculate its value exactly on the same basis as you have put before the Arbitrators?—Generally speaking, I would say yes.

You are asking the Arbitrators to value the portion of the undertaking that we are having transferred to us exactly on the same basis as if we were taking the whole?—Yes.

I want to ask you, as a valuer, if these two wells which are now in existence, and the reservoirs, had been in the added area, what more compensation than £75,000 would you have asked?—We must have asked enough to enable us to continue to supply our own district, no matter what the cost would be. We are basing our claim upon the capitalized value of the undertaking now in the district.

In re-examination by Mr. BALFOUR BROWNE, witness said if all were being transferred, the shareholders would have to part with the income of the whole, and the means of earning the whole. In this case, they were parting with the income from a portion; and the means of earning that income were left on their hands perfectly useless.

Mr *Henry Rofe* gave evidence upon the principle of valuation, which he said was now well established, that they valued at first upon the maintainable revenue, and then multiplied that by a certain number of years. The number of years represented the security; and the maintainable revenue represented the sum to be multiplied. He estimated that multiplying the divisible yearly profits by 36·36 was the price that should be paid to the Company.

This closed the case for the Company.

Mr. FITZGERALD, in opening the case for the Corporation, denied that the Company had been coerced into having the special clause inserted in the Bill. The clause was inserted by agreement. It was a Company that had no existence of any kind unless the Bill passed. They got rid of what would have been most formidable opposition, which would have probably resulted in the Bill being defeated, by having the clause inserted in it. Therefore the real state of the case was this, that they were willing, and thought it worth their while, to take their Bill and have their Company incorporated on the basis that if within seven years the boundaries of the city of Coventry were extended, and notice given by the Corporation, they were to sell this portion of their undertaking. They were only incorporated on this condition; and from the very moment of their existence, that condition was a portion of their Act of Incorporation, and their undertaking existed subject to it. Therefore, in no proper sense could they call this a compulsory expropriation of the Company. Their undertaking was only brought into existence on the basis that if the boundaries of Coventry were to be extended, the Corporation were to have the right to say that they would take the water supply into their own hands and purchase any portion of the undertaking which existed in the added area. The whole of the area which they had under their three Acts of Parliament represented one undertaking extending to something more than forty parishes in the county of Warwick; and the attempt to make out that there were three separate undertakings must fail. The income which they asked the Arbitrators to capitalize was one which the Company believed would arise within the next eight years. With regard to such an income, it offended common sense to say that it was to be

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valued on the same basis as if it was an existing income. If they were dealing with an established Company that had been earning a net income for a number of years, it might be perfectly fair to take 33⅓ years' purchase; but to apply this figure to an income which had no existence in the present, and which had never existed in the past, and which, therefore, was not only prospective but problematical, and must depend upon a number of circumstances which no one could foresee, the whole basis of their calculation of a constant increase of 10 per cent. was wrong. The Company had taken advantage of the great boom from 1896 to 1898. They had brought it into the calculation, but they had entirely omitted the fact that the ratio had been during the last three years a declining one. Therefore it was absurd to calculate that in the next eight years there would be a constant increase of 10 per cent in the rateable value, and to treat that as if it was an absolute certainty when in fact during the three previous years the increase was something like 5 per cent. They had also brought out a perfectly absurd figure in regard to population, because it had been arrived at by a fallacious method of calculation. In conclusion, Counsel urged that no allowance ought in this case to be made for compulsory sale, for the reason that the undertaking was brought into existence on the basis that they were to sell.

Mr. *S. Wood*, of Messrs. Lass, Wood, and Drew, gave the results of his examination of the books of the Company, which he had gone through at the request of the Corporation, and stated that they showed a total deficiency of £686 3s. 4d.

Mr. *Joseph E. Swindlehurst*, City Engineer of Coventry, adduced particulars of buildings and streets now in course of construction in Coventry and in the added area, and said he had no reason to suppose that the increase in the added area would be more than he had represented in tables produced. Not a single new street had been laid out in the added area since it had been annexed.

In cross-examination by Mr. Balfour Browne, witness said the Corporation were laying out a large sewerage scheme in Foleshill and Stoke (the added area), which would cost about £35,000. He had no reason whatever to think that when the sewerage scheme was completed there would be a greater development, as the present owners of houses and plans of buildings that had been passed were well aware of the scheme. He did not say there would be more buildings if there were no sewerage scheme, but that it would make no difference.

In re-examination by Mr. Fitzgerald, witness said that the sewerage scheme was decided upon at the date of annexation. When they were laying out the scheme, the population that they provided for at the end of thirty years was 17,000 in Foleshill, and 5500 in Stoke—that being the period for which they asked the loan of money.

Mr. *George Strachan*, examined by Mr. Fitzgerald, adduced figures, which he had prepared for the purposes of the inquiry. These related to the population of Coventry and the added districts from the census returns, inhabited houses, water rental, rateable value, &c. He deduced that the rateable value of the houses supplied in the added area given in the tables of the Company were over-estimated. It seemed to him that the sum of £700 would have to be spent in joining up the mains of the Company so as to enable them to continue with equal facility to supply after the severance as they did now; and this fact had been overlooked. Explaining the tables which he brought forward, based on the census returns, he stated that the basis of his figures was that he had credited each future consumer with the same return as the present average consumer produced for the next eight years. He had allowed the same yearly increase for meter supplies as had obtained in the past; and he had allowed the same yearly income from building supplies as obtained up to December, 1901. The number of years' purchase he took in this case was 28·57; this being calculated on the 3½ per cent. table. He regarded this as a very fair figure to adopt.

In cross-examination by Mr. Balfour Browne, witness admitted that his calculations were an estimate for the future based upon the past, and upon the census.

Mr. Balfour Browne: We make our calculations from the rate-books, and we ought to know as much as the census people. If the census return is not right, you would be starting with a wrong figure, both as to the number of houses and the population.

Witness: Yes. I start upon houses and population, and do not deal with rateable value. The basis is that each house will in the future maintain the rateable value that it has in the past.

Now in this particular case, every one of your figures assumes that we are going to get in 1910 £983. If we get it, there is no question about security. Why do you not put the number of years' purchase at 33⅓?—Because it is an estimate. If it was an increasing district with a prospective value, I would put the figure higher than 28·57.

With regard to the growth of companies you have had to deal with, do you not find that many of them have grown far more than had been anticipated?—I do not know about that; but I should look upon it as a great phenomenon if the figures of the Company should prove to be correct.

Mr. Fitzgerald: With regard to the number of years' purchase, you say that you take a less number of years' purchase with regard to a company like this, which has no existing net income, than you would have taken with a company which had an existing net income?

Witness: Yes.

If a company has a net income which has existed for a number of years, then there is a strong probability of that income continuing?—Yes; particularly if you have also to value the prospective income.

Mr. *E. M. Eaton*, examined by Mr. Honoratus Lloyd, said he thought the method adopted by Mr. Strachan and himself of getting at the revenue of the Company, based upon the census, was a fairer and more proper method than that adopted by the Company upon the rateable value system, which was utterly fallacious and illusive. The Company proceeded upon the assumption that, with an increase in the rateable value of the district, they would obtain an increase in their revenue; but this by no means necessarily followed. They had in the district a railway, canals, a tramway, and factories, and they

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had also this undertaking. All these items might have their rateable value materially increased, and yet of necessity not a house added in the district. It was quite clear that if an improvement took place in the rateable value of what they might call joint-stock undertakings, that bore no direct ratio to the increase in the number of houses. For a company of this kind, where there was no ascertained profit but purely speculation, the multiplier they were taking, that of 28·57, based on the 3½ per cent. table, was, he thought, a fair one.

This concluded the evidence on behalf of the Corporation.

Mr. FITZGERALD, in addressing the Court upon the evidence, urged that 28½ years' purchase was a very fair figure to allow. The valuation figures adduced on behalf of the Corporation had been most carefully prepared, and were much more likely to be correct than those put forward by the Company.

Mr. HAWKSLEY remarked that the Arbitrators felt some difficulty upon the subject of the works. The Company, upon the one hand, had not given them any information as to what they could do with the works which were left on their hands, and the Corporation, on the other hand, had not told them what, in their opinion, the works would be capable of supplying—whether they would be able to supply any other portion of their district, and, if so, what.

Mr. FITZGERALD said that admittedly they were capable of supplying the whole of a certain district marked on the map, and were designed for the purpose of supplying that district. It had not been suggested by Mr. Quick, the Company's Engineer, that the works left upon his hands were useless.

Mr. HAWKSLEY said all they wanted was information, instead of having to help themselves.

Mr. BALFOUR BROWNE contended, on behalf of the Company, that the real point at issue was that while they in their valuation proceeded upon rateable value, the Corporation proceeded upon population; and the question for the Court to decide was which of these methods they would apply. He suggested that the right one was to proceed upon the rateable value.

This closed the proceedings. The Umpire will make his award in due course.

The Lighting of New Palace Yard.—In the House of Commons, on Tuesday, Mr. John Ellis put his question as to the lighting of New Palace Yard and its vicinity, referred to last week, and was informed by Mr. A. Fellows that the matter was engaging the attention of the First Commissioner of Works, and it was hoped an improvement would soon be effected.

Water Supply of Auckland.—A scheme for a permanent water supply for Auckland (New Zealand) has been submitted to the City Council by Mr. H. Munro Wilson and Mr. J. Carlaw, the Council's Water-Works Engineer. The report favours taking water from the Waitakerei, the estimated quantity available being 4½ million gallons per day, which is about twice the present daily consumption. The cost is reckoned at £111,770.

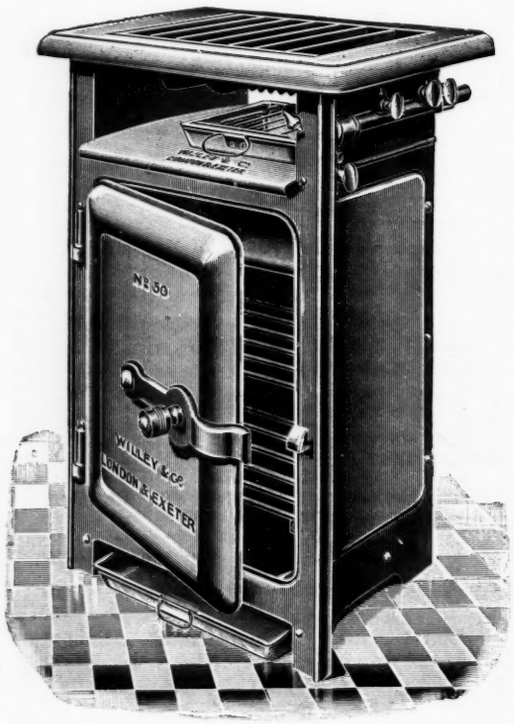
NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

It is a saying which requires no amplification, that the appointment of a Convener fixes the policy of a Committee. This truth was doubtless the occasion of the discussion which took place this week over the appointment of a Convener for the Perth Corporation Gas Committee. The post has been held by Bailie Watson since 1899, during practically the whole period of the construction of the new gas-works. It was fortunate for the city that they had a man of such high business qualifications as Mr. Watson in office at a time when there was so much important work to do. He did not seek re-election, and the name of ex-Bailie Cuthbert was proposed for the post. This gentleman was Convener in 1898-9, at the time when the new gas works were being thought out. When his name was mentioned, there was a grumble to the effect that it was unfair to young men that they should not get a share of the convenerships. There was a discussion, after which Mr. Cuthbert was appointed by a majority. It is certainly right that young men should get a share of honours; but they should begin upon Committees of less importance than the Gas Committee.

It is doubtless a disappointment to many that the party who raised the agitation in Perth over the alleged increases in gas bills have refused to accept the conclusions at which Mr. Thomas Newbigging arrived after investigation on the spot. The subject was again brought before the Town Council on Monday night by Mr. Macpherson, who has all along been one of the principal agitators in the matter. In moving that a Committee be appointed to inquire into the increases, and to adjudicate and dispose of all complaints from consumers, Mr. Macpherson said that he moved to the same effect before, but the then Lord Provost ruled his motion to be incompetent. His Lordship did so on getting a tip from Bailie Watson—an interested party. The tip was that, under the Gas Acts, they had no power to compromise and settle claims; but they knew that, as a matter of fact, they had compromised claims—with the Station Committee and others. He wanted to know whether his motion was competent now. The Clerk said it was; and then Mr. Macpherson said he thought they should settle the thing in a sensible manner rather than allow it to be decided in the Law Courts. The Board of Trade had just drawn the attention of Mr. Lawson, their Inspector of Meters, to the fact that the local standard gas-meter had ceased to be a legal standard in July, 1896, and would require to be verified. They had been found having in their possession a thing which was six years out of date. This showed them they were not up to date, as they ought to be; and he had not the slightest doubt it would also be found that some of the practices in connection with the meters might not be up to date. It was all very well for experts, or alleged experts, to brush aside a question of this kind; but here they had in the minutes that they had been following the practice since 1896. The question had been raised that they had no power at all to



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compromise claims. He contended that they had, and that they had done so again and again. They ought to endeavour to come to a decision, and not allow the question to drag out in the Law Courts. At one time, a number of members were in favour of the proposal that a small Committee should be appointed. At that time he was not in favour of it; but the other scheme they had tried had turned out an expensive failure. There was no person in Perth who attached any importance to the report made by Mr. Newbigging. None of the electors would be satisfied with it; and if he had realized that Mr. Whimster was practically their Consulting Engineer, he might have taken up a different position than he did in connection with Mr. Newbigging. He thought the only solution of the difficulty would be to appoint a small Committee of five members, who, with the assistance of Mr. Whimster, could deal with the claims. Mr. D. C Young moved the previous question. He considered they would be well advised to let sleeping dogs lie. Bailie Watson, the ex-Convener, said he had no objection whatever to a Special Committee being appointed; but they would only have power under statute, and that power did not include the compromising of claims. Any compromises he ever knew of were when the meters were at fault; but when meters were correct, they could not get beyond them. The Council divided upon the matter, when the previous question was carried by 16 votes to 8. This I regard as a sensible resolution; and I trust that the last has now been heard of a subject the continued obtrusion of which upon the public is calculated to give pain to the officials of the gas undertaking. It is reassuring to read of Mr. Young—one of the younger councillors—advising that the subject should be left alone, in the interests of harmony at the Council board. He is to be congratulated in thus early recognizing that order and peace are indispensable qualities if public business is to be carried on with success. The agitating party were beaten with their own weapon—Mr. Newbigging's investigation. They have endeavoured to throw over his report, but have been unsuccessful. The Council, as reconstituted by the elections, have shown that they have no sympathy with them; and surely now they will cease flogging the dead horse of the gas bill agitation. I am not sure that they will, for I see that the Gas Treasurer has complained to the Gas Committee that he is having considerable difficulty in collecting the outstanding arrears for the period prior to May 15, and has asked for instructions. He has been told to request immediate payment, and to report to the next meeting of the Committee. If any consumer is of opinion that he can escape payment for the quantity of gas recorded by his meter as having been consumed, the discussion in the Town Council this week should open his eyes. To refuse payment means resort to the law; and the Law Courts have only one method of dealing with such cases—believing what the meter says.

The Corporation of Peebles are not making much headway with their scheme for the transportation of the burgh gas-works to a new site. This is not their fault, but is due to the action of the Railway Company and of Messrs. J. & F. Anderson, Writers to the Signet, of Edinburgh, the Law Agents for the proprietor of the site which has been selected. This week a letter from Messrs. Anderson has been submitted, in which they requested the Council to agree to some additional conditions. They asked a stipulation to the effect that feuars on the estate, although not in the burgh, should be entitled to be supplied with water and gas on as nearly as possible the same terms as those within the burgh, and that the Commissioners should supply water to a field on the east side of the feu. They also stated that, on account of the privileges granted in the feu, they proposed to add a lump sum of £10 per annum to the feu-duty. The Clerk said he had replied to the letter, stating that no change of circumstances had arisen which warranted such an addition to the feu-duty, and pointing out that this should have been proposed at the time when the offer of £20 per acre was made. No reply had been received to this letter, and the Commissioners agreed to take no further action till a reply should come to hand. If it were not for the annoyance and the delay which is occasioned, there is something almost amusing in the notion of the landowner piling on further conditions, after the negotiation was regarded by the other side as closed, and then, treating these conditions as "privileges granted," making a large addition to the annual charge.

A strange report comes from Kilsyth. At a meeting of the Town Council this week, it was reported that a yield of 14,000 cubic feet of gas per ton of coal had been obtained, whereupon complaints began to be made regarding the quality of the gas. Then, it is added, the Gas Manager was called upon to explain; and he pleaded that he was handicapped in the matter of enrichment, but that he expected, now that he had got new boilers in position, he would be able, by another fortnight, to give an increased enrichment of the gas. There is surely some confusion here.

The Corporation of Arbroath have at last had their eyes opened on the subject of the water supply of the town. For years they have been trying to get a supply from wells in the Nolt Loan; but it has recently been borne in upon them that it is altogether inadequate. They had before them recently a report by Messrs. Crouch and Hogg, of Glasgow, whom they had consulted as to the existing supply and the probable sources of augmentation. These gentlemen came to the conclusion that no augmentation of the supply could be obtained from any extension of the present works. They therefore examined the surrounding districts, with a view to finding a source of supply capable not only of yielding 720,000 gallons of water daily, but of providing for future requirements should the population increase. They found that in the districts near Arbroath there was only one place from which a suitable supply could be obtained—viz., the Crombie reservoir, served from Dundee. Excepting this, there was, so far as they knew, no adequate source nearer than the streams on the southern slopes of the Grampians. Two of these—the Noran and the Cruick—were suitably situated for the purpose. In the opinion of the Engineers, the Noran, from its larger drainage area and other reasons, was the better source. I may say that it has a drainage area of 4430 acres, and much of its water is derived from springs, which are said to be reliable at all

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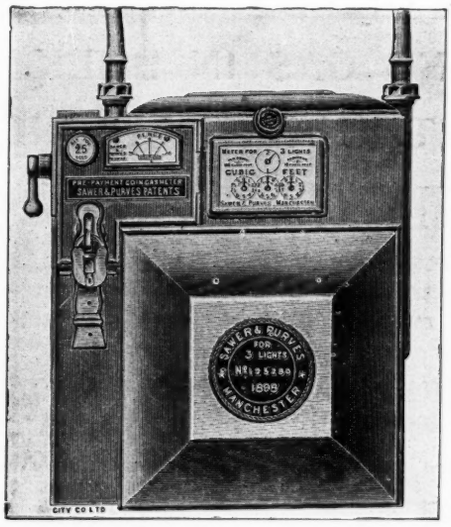
THE POSITIVE DRY PREPAYMENT METER



FOREMOST EVER SINCE.

SAWER & PURVES,
MANCHESTER.

seasons of the year. The level of the intake would be 745 feet above Ordnance datum, and the total distance from the Noran to the burgh boundary is 21½ miles. The approximate estimate of the cost of the requisite works under this scheme is £70,000. The Council have referred the matter to the Water Committee.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Nov.* 15.

Sulphate of Ammonia.

There has heen an improved demand, but supplies have also been more abundant, and quotations have declined to £11 7s. 6d. per ton f.o.b. Hull, and £11 10s. to £11 11s. 3d. per ton f.o.b. Liverpool and Leith. For November and December delivery, buyers are endeavouring to get in at a further decline, but manufacturers are in no hurry to make sales over this period unless at an advance. For delivery over the spring months, makers are practically off the market, their ideas being far above those of consumers. Speculators, however, are offering abroad at about the level of spot prices, and are finding buyers.

Nitrate of Soda.

This is steady on spot at 8s. 10½d. to 9s. per cwt., according to quality, but there is still an absence of interest in the forward position.

LONDON, *Nov.* 15.

Tar Products.

Values all round remain about the same as when last reported; the demand being fairly well maintained. As regards pitch, it is difficult to fix the value, as very high prices are being paid for home consumption; but the large makers appear to be fully sold, and therefore decline to offer any quantity. There is a very good inquiry for January-June next, while in some instances inquiries have been made for September, 1903—June, 1904. The position of anthracene remains the same. There is more inquiry for "A" quality for forward delivery; but "B" qualities are entirely neglected. Crude carbolic continues steady. Some quantity of 60's has been placed at 1s. 8½d. for November-December shipment, while the value of crystals remains unchanged. The demand for benzol continues good for prompt delivery; and there is a strong inquiry for next year. But manufacturers declined to offer, except at considerably improved prices. Creosote is very scarce for early delivery; and there is a good demand for January-June. There are several large inquiries in the market for export; but London makers do not appear anxious to sell for either prompt or forward delivery, and in some instances decline to quote.

The average values during the week were: Tar, 20s. to 25s. 6d. Pitch, London, 55s. to 56s.; east coast, 52s. 6d. to 54s.; west coast, 51s. to 52s. 6d. Benzol, 90 per cent., 8½d. Benzol, 50-90 per cent., 7⅞d. to 8¼d. Toluol, 6½d. to 7d. Crude naphtha, 2⅞d. to 3d.; solvent naphtha, 8d. to 9½d.; heavy naphtha, 9d. to 10d. Creosote, London, 1¾d.; North, 1⅝d. to 1⅝d. Heavy oils, 2d. Carbolic acid, 60 per cent., 1s. 8½d. to 1s. 9d. Naphthalene, 40s. to 55s.; salts, 23s. 6d. to 26s. Anthracene, "A," 1½d. to 1⅝d.; "B," 1d. nominal.

Sulphate of Ammonia.

The market is quiet; and there is not much business doing, especially for prompt delivery, although for forward there appears to be rather more inquiry. Beckton still quote £11 12s. 6d. for November-December; but there are second-hand sellers at under this price. Another London Company has placed a considerable quantity for early delivery at under £11 10s., but are reported now to be firm at this price, having declined £11 8s. 9d. for prompt. In Hull, a little business has been done at £11 8s. 9d.; but only for prompt delivery, as consumers will not pay more than £11 7s. 6d. for December shipment. In Leith, there is little to report. Manufacturers ask £11 10s.; but consumers decline to pay this price for November-December. Liverpool is fairly good; but there is not much doing, although good prices have been paid for prompt shipment.

COAL TRADE REPORTS.

Lancashire Coal Trade.

In the coal trade of this district there is a gradual slackening of demand for all descriptions of fuel, and supplies are becoming more plentiful on the market. Pits, for the most part, are still working full time; but in many cases stocks are accumulating in waggons under load on the sidings, and here and there small quantities of the better qualities of round coal are going into stock. At the pit mouth, Lancashire house-fire coals remain at about 15s. up to 16s. per ton, seconds 13s. 6d. to 14s. 6d., and common sorts about 10s. to 11s. The demand for iron making, steam, and general manufacturing purposes remains of much the same indifferent character reported of late; and with a lessening inquiry for common house-fire coals, there are increasing supplies of the lower descriptions of round coal for steam and forge purposes coming on the market. This necessarily is tending to weaken prices, though there is no really quotable reduction. Ordinary steam and forge coals could be bought readily at about 8s. per ton at the pit, and in some instances for special sale at a trifle under this figure, with average quotations still about 8s. 6d. to 9s. Engine classes of fuel are becoming, if anything, more of a drug on the market—especially in the lower qualities. The better descriptions of slack are not moving away so freely; and in some cases these are hanging at the collieries. In the lower sorts, supplies are largely in excess of requirements, with increasing competition from Derbyshire and Yorkshire; and to effect special clearances, exceedingly low figures are frequently quoted. This gives a weak, irregular tone to the market; and it is difficult to get at definite quotations. At the pit, best Lancashire slack is quoted 6s. 6d. to 7s. per ton, medium sorts about 5s. 6d. to 6s., with common Lancashire slack ranging from 4s. to 5s. 6d.; while slack in

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the Derbyshire district is to be bought from 2s. to 3s. and 3s. 3d., according to quality. The shipping trade is slow, and prices are coming again to old rates; 10s. to 10s. 6d. per ton being about full average price for steam coal, with good slack obtainable at 6s. per ton, delivered at ports on the Mersey.

Northern Coal Trade.

On the whole, there is a steady demand for coal; but for one or two classes the export seems to be decreasing, and this has its influence on the price. Best Northumbrian steam coals are quoted from 11s. to 11s. 6d. per ton f.o.b., second-class steams are 10s. to 10s. 6d., and steam smalls are 5s. 6d. to 6s., with a demand that keeps most of the collieries well employed, though without much pressure in the inquiry. There is now an inquiry for Durham gas coals that is nearly the highest of the year, and thus, after the long contract quantities are met, there is not much for occasional sales. The quotations for the latter vary from about 9s. to 10s. per ton f.o.b., according to quality; and some contracts over a period of next year are spoken of as settled at between the two figures named. Gas coke is steady; the production being now heavy, and the exports to the Baltic less. Still, the quotation for export is about 12s. 6d. per ton f.o.b. for good quality.

Scotch Coal Trade.

Trade is very active, both for home and foreign consumption. The season is exceptionally mild, and in this respect it favours the export to northern ports, which is very heavy. The prices quoted are: Main 9s. 3d. to 9s. 6d. per ton f.o.b. Glasgow, ell 10s. 3d. to 11s. 3d., and splint 10s. 6d. to 11s. The shipments for the week amounted to 256,484 tons—a decrease of 30 tons as compared with the previous week, but an increase of 53,223 tons as compared with the corresponding week of last year. For the year to date, the total shipments have been 9,450,977 tons—an increase of 896,903 tons upon the same period of last year.

Hayfield Water Supply.—It was reported at a special meeting of the Hayfield Rural District Council on Thursday that the Local Government Board had sanctioned a loan of £5000 for the construction of water-works.

Water-Works Extensions at Runcorn.—An important addition to the water-works of the Runcorn Urban District Council has just been completed. For some time the inhabitants of Weston, which stands on a hill, had complained that the water supply was insufficient and intermittent. To remedy this, the Council caused to be built, from the designs of Mr. J. Wilding, the Town Surveyor and Water Engineer, a stone tower, which rises to a height of 250 feet above Ordnance datum, and has on its summit an iron tank, having a capacity of 20,000 gallons. The water is pumped into the tank by a double-ram pump at the Runcorn pumping-station, and is thence distributed throughout the township—the height of the tower giving the requisite pressure. The cost of the work has been £1100.

Newhaven and Seaford Water Company.—The report which was adopted at the recent meeting of the Newhaven and Seaford Water Company stated that the revenue account for the year ending Sept. 29 last showed a profit of £1944; and the balance available for distribution amounted to £1766. Out of this, the Directors recommended the payment of dividends of 3½ per cent. per annum on the original "A" capital, and £2 9s. on the additional "B" capital, both free of income-tax. The Directors were also empowered to raise £5000 more of the "B" capital authorized by the Company's Special Act.

Opening Streets in London.—At the meeting of the Court of Common Council of the City of London last Thursday, a letter was read from the London County Council relative to the breaking up of streets in London by companies and others having statutory powers; intimating that the Council had addressed a letter to the Home Secretary with a view to the appointment of a Select Committee of Parliament to hold an inquiry into the subject, and asking the Corporation to co-operate in impressing upon the Government the importance of the question. The communication was referred to the Streets Committee.

New Issues of London Water Companies' Stock.—Tenders were received last Tuesday for an issue of 3 per cent. debenture stock of the Lambeth Water Company. Those at 95½ received 10 per cent. of the amount applied for; those above this figure in full. On Thursday, the tenders recently invited by the New River Company for an issue of similar stock sufficient to raise £66,026 were opened. The applications amounted to £273,800, at prices varying from £100 to £97 (the minimum). Tenders at £97 6s. 6d. will receive about 60 per cent. of the amount applied for; those above this figure being allotted in full. The average price obtained is £97 11s. 6d.

Supply of Gas-Stoves at Cowes.—At the last meeting of the Cowes District Council, Mr. Fellowes, sen., brought up the report of a meeting of the Special Gas Committee the previous evening, recommending that application should be made to the Local Government Board for permission to borrow £800 for the provision of gas stoves and fires to supply to the ordinary consumers. In moving the adoption of the report, he explained that since the gas-works had been in the hands of the Council the constant effort had been to extend the use of gas. The increase which had taken place in the consumption had been brought about largely by encouraging the use of cooking-stoves, the introduction of incandescent mantles, and the provision of slot-meter installations. The Committee thought there was a field for a large extension of their efforts. The consumers of gas numbered something like 1350, and only about 150 had cooking-stoves. In other places, two-thirds of the number used these necessary conveniences. It was only after anxious thought that the Committee made the recommendation of taking up a loan, and they hoped to be able to borrow the money for a period of at least twelve or perhaps fifteen years. The report was adopted.

A Burning Question.

DOES IT PAY TO SUPPLY CONSUMERS WITH

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Improved Street Lighting at Sowerby Bridge.—An important improvement is to be effected in the public lighting of Sowerby Bridge; the District Council having decided to light the main street on the incandescent gas system. The contract has been placed in the hands of Messrs. W. Sugg and Co., Limited.

The Labour Party at Croydon and the Election of Mr. Helps.—The Labour Party at Croydon, who put forth every effort to defeat the candidature of Mr. J. W. Helps for the West Ward, and who, as our readers know, failed lamentably in attaining their object, have now given notice that they intend to contest the legality of his election, he being "the salaried servant of a Company having large financial relations with the Corporation." Mr. Helps's election was a great set-back to the party.

Littlehampton Water Supply.—New water-works for Littlehampton were formally opened on Saturday, the 8th inst., by the Duke of Norfolk. The supply is obtained from the chalky soil at the base of the South Downs, about three miles from the town. There an artesian well is sunk, and two engines, each of 25 indicated horse power, pump the water, at the rate of 25,000 gallons per hour, up to a reservoir, whence it flows by gravitation into Littlehampton—a distance of about 2½ miles. The total cost of the works has been £22,500, of which £3000 was contributed by the Duke.

Oriental Gas Company, Limited.—The report for the year ended June 30 shows that the business of the Company has continued to advance; the gas-rental exhibiting an increase over the corresponding figures, while the expenditure shows no expansion beyond what is the necessary concomitant of extension of business. The rate of exchange has averaged fractionally higher than the rate for the preceding year. The conversion of the lighting of the streets of Calcutta and Howrah from the old fashioned flat-flame burners to the incandescent system has been effected with the latest and most perfect appliances, so that in the public thoroughfares of Calcutta may be seen lamps of a type equal, if not superior, to any in the streets of London. The cost of this operation includes the necessary alterations of mains and renewals of service-pipes, &c. This outlay is thus, practically, a suspense account, part of which has been written off this year, and the balance (£9500) the Directors propose to extinguish within the next five or six years. The balance on the profit and loss account is £18,074, out of which the Directors recommend the payment of a dividend of 4½ per per cent., tax free; making a total distribution of 8 per cent. for the year, and leaving £4574 to be carried forward.

Portsmouth Water-Works Company.—At the half-yearly general meeting of this Company on the 27th inst., the Directors will report a balance of £24,470 available for distribution, out of which they will recommend the payment of the full statutory dividends. This, after deductions for void houses, &c., will leave a balance of about £7781 to be carried forward. During the six months ending the 30th of September, 4604 yards of additional street service-mains and 911 yards of trunk-mains were laid, in addition to a new 36-inch rising-main; making a total of about 54 miles of trunk-mains and 136 of street service-mains. The number of additional services connected with the mains during the half year was 501; making the total number of premises under constant supply by the Company in all the districts 42,156. The quantity of water pumped from Havant, Bedhampton, and Farlington was 1,481,210,000 gallons, or an average daily supply for all purposes of 8,138,000 gallons; being a considerable decrease compared with the corresponding period of last year. The quantity supplied for domestic use was equal to an average of about 30·3 gallons per day per head of the population, exclusive of meter supplies. The number of fire-hydrants fixed in the Company's districts is 3360.

Water-Works Extensions at Clay Cross—A inquiry on behalf of the Local Government Board was held by Major C. E. Norton at Clay Cross last Tuesday, respecting an application by the Urban District Council for a loan of £3800 for water-works purposes. It was explained that the money was required to obtain a further supply of 50,000 gallons of water per day by means of boring and sinking a well; and arrangements had been made to obtain 400 square yards at a cost of £100. Mr. Radford pointed out that if they only succeeded in getting 10,000 gallons per day it would justify the outlay. The estimate for temporary works was £1570; and for the permanent works, £2000. Mr. R. F. Hartwright, Clerk to the Chesterfield Rural District Council, said he did not appear to oppose the application; but the Chesterfield Council were about to obtain powers to borrow £15,000 to £20,000 for extending their water supply, which was in the same direction as the Clay Cross supply. He contended that the Clay Cross Water-Works Act, 1899, did not empower them to extend their works outside their limits. One of the gentlemen present inquired if the new mains could not be paid for out of the profits realized from the water concern. The Inspector: Not in spite of the big loan they have to face.

The Birkdale Electric Supply Company have decided to adopt a new charge of 2d. per unit for current used for heating purposes. It is similar to one in force at Southport.

Messrs. Biggs, Wall, and Co. have received from Mr. R. O. Thompson, the Engineer of the Metropolitan Gas Company of Melbourne, an order for their charging-machine, to be installed in the Bendigo Gas Works.

A recent number of the "Comptes Rendus" contained analyses of nine samples of air collected in the galleries of a coal mine, by M. Nestor Gréhant. The carbonic acid was found to vary between 1 and 1·8 per cent.; methane, between 3·5 and 7·5 per cent.; and oxygen, between 16·1 and 18 per cent. Attention is drawn by M. Gréhant to the high percentage of marsh gas, which in three cases was present in sufficient quantity to form an explosive mixture.

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Messrs. Clapham Bros., Limited, of Keighley, have secured a large contract from the Manchester Corporation Gas Department, for their Bradford Road works, consisting of the structural steel work, including roofs, &c., for the purifying-house, together with 12 purifiers, each 35 feet square, complete with valves and connection, elevators, gas-engines, and "goliaths."

The Hungerford Water-Works Company, Limited, has been registered, with a capital of £12,000, in £5 shares, to acquire the undertaking authorized by the Hungerford Water Provisional Order, granted in the year 1901, and the Water Provisional Orders Confirmation (No. 1) Act of the same year, and to carry on the general business of a water company.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

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GAS-FITTER. Wigan Gas Department.
MANAGER FOR SMALL WORKS. No. 3946.
STOKERS. Burnham Gas-Works.
STOKER (Shovel Charging). Sunbury Gas-Works.
SULPHATE MAKER, &c. Broughty Ferry Gas-Works.
WATER INSPECTOR. Mansfield Corporation.
WORKING FOREMAN. No. 3926.
WORKING FOREMAN FOR SMALL WORKS. No. 3947.
WORKING MANAGER. Ruthin Gas Company, Nov. 25.

SITUATIONS WANTED.

ASSISTANT OR CHIEF. No. 3940.
DRAWING OFFICE OR ASSISTANT IN GAS-WORKS. Wedd, South Norwood.
WORKING MANAGER OR FOREMAN. Burt, Glastonbury.

AGENT WANTED BY GERMAN MANUFACTURER. No. 3939.

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AUTOMATIC GAS-LIGHTING DEVICE. Brown, Wigan.

PLANT, &c. (Second-Hand), FOR SALE.

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RAILS, TURNTABLES, WAGGONS, &c. Beatson, Derby.

PLANT, &c. (Second-Hand) WANTED.

TANK AND GASHOLDER. Wright, London.

SALES OF STOCKS AND SHARES.

ALDERSHOT GAS AND WATER COMPANY. Dec. 2.
BRIGHTON AND HOVE GAS COMPANY. Nov. 25.
EASTBOURNE GAS COMPANY. Nov. 29.
GREAT GRIMSBY GAS COMPANY. Dec. 15.
GREAT YARMOUTH WATER COMPANY. Dec. 9.
ILFORD GAS COMPANY. Nov. 25.
LEA BRIDGE GAS COMPANY. Dec. 2.
NEWCASTLE AND GATESHEAD GAS COMPANY. Dec. 8.
READING GAS COMPANY. Dec. 2.
SOUTH ESSEX WATER COMPANY. Dec. 9.

TENDERS FOR

FIRE-BRICKS AND FIRE-CLAY.

BRADFORD GAS DEPARTMENT. Tenders by Nov. 27.

GASHOLDER (Adding Lift to).

PONTYPRIDD GAS DEPARTMENT. Tenders by Dec. 15.

GASHOLDER TANKS.

COVENTRY GAS DEPARTMENT (Concrete). Tenders by Nov. 22.
YEOVIL GAS DEPARTMENT (Steel). Tenders by Dec. 3.

IRONWORK FOR GASHOLDER TANKS.

COVENTRY GAS DEPARTMENT. Tenders by Nov. 22.

RETORTS.

BRADFORD GAS DEPARTMENT. Tenders by Nov. 27.

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No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

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CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.

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TO GAS AND WATER OFFICIALS.

HIGH CLASS CYCLES at lowest Prices guaranteed and sent on APPROVAL for Cash or GRADUAL PAYMENTS. Catalogue and Testimonials from Gas Managers post free.
MELROSE CYCLE COMPANY, COVENTRY.

SULPHURIC ACID for Sale.

BROTHERTON AND CO., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

COAL GAS TAR wanted.

Gas Managers in Gloucester, Somerset, Worcester, Devon, Wilts, Hereford, Monmouth, and Glamorgan PLEASE NOTE. BEST PRICE offered, either on Fixed or Sliding Scale Basis.

State Quantity to offer for Prompt and Forward Delivery.

The SHARPNESS CHEMICAL COMPANY, Tar Distillers, Sharpness Docks, GLOS.

OXIDE OF IRON.

FIRE Cement, Paint, Mains, Tubes, STREET LANTERNS, GLASS, TOOLS, &c.
BALE & CHURCH,
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LONDON, E.C.

IT is worth your while to buy direct. THE RELIANCE LUBRICATING OIL COMPANY 19 and 20, Water Lane, Great Tower Street, London, E.C., handle all kinds of Lubricating Oils, for Engines, Cylinders, Dynamos, Spindles, &c., Burning Oils, Solar Distillates, Carburetting Oils, and Spirits for Gas Making; Motor Oils, Fuel Oils, Animal, Fish, and Vegetable Oils, &c., for all purposes. Write for our "Trade Mark" Inkstand, sent free to customers. Non-customers, 2s. 6d. each. RELIANCE LUBRICATING OIL COMPANY, London, Glasgow, Newcastle-on-Tyne, &c. Established 1858. Telegraphic Address: "Substral," London; A.B.C. Code used. Telephone No.: Avenue 5891.

AMMONIACAL LIQUOR wanted.

BROTHERTON AND CO., LTD., monia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

PATENTS AND TRADE MARKS PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
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STREET AND SHOP LAMPS AND LANTERNS.
MARK DUFFIELD & SONS (Established 200 Years), makers of Street and Shop Lamps to own Pattern and Design. Any description of Lamp made. Inquiries invited.
London Manager: EDWARD PADFIELD, West India House, 96 & 98, LEADENHALL STREET, E.C.
Telegraphic Address: "EUPATHY, LONDON."

PENNY-IN-THE-SLOT WORK.
H. GREENE & SONS, Ltd., are prepared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.
19, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "LUMINOSITY."

SULPHATE OF AMMONIA SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.
For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."
Largest Practice and most Up-to-Date Works in Britain.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

ADVERTISER (age 23), five years' with Gas-Plant Manufacturers, and one with Motor Engineers, requires SITUATION in Drawing Office, or as Assistant, in Gas-Works or Engineer's. Slight knowledge of Gas Manufacture. Good References.
Address F. H. WEDD, Rushmere, Holmesdale Road, SOUTH NORWOOD, S.E.

AN Assoc. M. Inst. C.E., Engineer and Manager of a medium-size Gas-Works for thirteen years, desires a change, as ASSISTANT or CHIEF. Technically trained at a large Works, practical experience of Regenerative Furnaces and Carburetted Water Gas. First-class results. Excellent Testimonials and References. Replies will be treated in confidence.
Address No. 3940, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Man to make Sulphate and do odd work.
Apply, by letter, to FORBES WADDELL, Gas-Works, BROUGHTY FERRY.

WANTED, Two Stokers, used to Shovel Charging. Make about 9 million cubic feet.
Apply, by letter, to Mr. JOHN COX, Secretary, Gas-Works, Burnham, SOMERSET.

WANTED, a Good Stoker. Shovel Charging, Regenerator Settings. Wages 33s. per week.
Apply, with Reference, to the MANAGER, Gas-Works, SUNBURY.

WORKS Foreman or Working Manager. Experienced Man (age 36) wants Situation as above. First-Class Testimonials.
Address H. BURT, Corporation Gas-Works, Glastonbury, SOMERSET.

COUNTY BOROUGH OF WIGAN.
(GAS DEPARTMENT.)

WANTED, a good all round Gas-Fitter; also one with Practical Experience Public Incandescent Lighting.
Particulars of the two berths may be obtained on application, in writing, to the undersigned.
References only to accompany the application of the Candidates.

J. TIMMINS,
Engineer.

RUTHIN GAS COMPANY.

WANTED, by the Ruthin Gas Company, a steady practical man as WORKING MANAGER. Must be a good Carbonizer, and used to Engine and Exhauster, and able to take Indices of Meters, and lay Mains and Services. Preference will be given to one having a knowledge of Fitting. Assistance provided. Wages 30s. per week, with House, Garden, Coal, and Gas. Annual make about 7 millions.
Applications (stating age), with References and Testimonials as to ability and character, to be sent to Mr. David Jones, Secretary, Gas Company, Ruthin, North Wales, by Tuesday, the 25th of November inst.

COMPETENT Gas-Fitter Wanted by the Londonderry Gas-light Company. Must be quick and accurate at reading Meter Indices. Wages 28s. per week.
Apply, with References, to the MANAGER, Gas-Works, Lecky Road, LONDONDERRY.

GAS MANAGER.

WANTED, an Experienced Engineer as MANAGER only, for a small Gas-Works carbonizing about 8000 Tons per annum.
State (by letter) Age, full Particulars of Experience, and Salary required, to No. 3946, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

AGENT Wanted, by German Works, for the sale in the United Kingdom of WATER-METERS, HYDRAULIC BLOWERS, WATER-PRESSURE INDICATORS, and other Appliances. A well-introduced Civil Engineer preferred.
Apply, by letter, to No. 3939, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at once, a Working Foreman for a small but rapidly increasing Gas-Works in Essex, making about 3½ millions. He must be an experienced man, capable of doing Fitting work, and be willing to make himself generally useful.
Apply, by letter, stating Age, Experience, and Wages required, to No. 3947, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Water Inspector. Permanent employment to a steady and reliable Man. Experience with Waste-Water Meters necessary.
Apply, with Reference, stating Age and Wages required, to

ARTHUR GRAHAM,
Gas and Water Engineer.
Mansfield.

TO BE SOLD—Gasholder, Two Lifts, with Five Columns, 43,000 feet capacity, which can be increased to 49,000 feet if preferred.

WANTED—TANK and GASHOLDER, 20,000 to 25,000 feet capacity.
Write J. WRIGHT, 181, QUEEN VICTORIA STREET, E.C.

QUANTITY of Good Relayable Flange and Bull-Head RAILS FOR DISPOSAL, suitable for Sidings. Also TURNTABLES, CHAIRS, SLEEPERS, POINTS and CROSSINGS, PORTABLE RAILWAY and WAGGONS.
Apply to JOHN BEATSON & SON, 6, The Strand, DERBY.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

IMPORTANT TO LIGHTING ENGINEERS AND COMPANY PROMOTERS.

FOR SALE—Automatic Gas Lighting Device (Patent No. 2873, Feb. 1901), for use particularly in STREET, RAILWAY STATION, and LARGE BUILDING LIGHTING. Shadowless. Simple in Construction. Cheap in Manufacture. Adaptable to all Fittings. Proof against all weathers. Can be seen working successfully in Street Lanterns and large Buildings in Hindley, Lancashire.
For further Particulars, apply to A. BROWN, 619, Liverpool Road, Platt Bridge, WIGAN.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.

DISUSED GAS PLANT.

THE Commissioners have for Disposal the whole of their GAS-WORKS PLANT formerly comprising the Leith Gas-Works, consisting of RETORT and FURNACE FITTINGS, HYDRAULIC MAINS, BUCKSTAYS, FLOOR PLATES, ANNULAR and TUBULAR CONDENSERS, DONKIN'S STEAM-ENGINES and EXHAUSTERS, ROTARY WASHER-SCRUBBERS, PURIFIERS and COVERS of various sizes, &c., &c., &c.
Permits to view and quotations for all or sundry parts of the Plant to be addressed to Mr. W. R. HERRING, Gas-Works, New Street, EDINBURGH.

URBAN DISTRICT COUNCIL OF PONTYPRIDD.
(GAS DEPARTMENT)

THE above Council invite Tenders for adding a THIRD LIFT (100 ft. diameter by 24 ft. deep) to the present Two-Lift Holder at their Treforest Gas-Works.
Particulars and Form of Tender may be obtained from, and Plans and Specifications seen at, the Offices of the Engineer (Mr. Edward Jones, Treforest), on payment of One Guinea, which will be returned on receipt of a *bonâ fide* Tender.
Copies of the Specifications and Prints of the Holder may be obtained on payment of 10s. 6d., not returnable.
The Council reserve the right to consider any modification of the above Plans or Specifications, and to allow Contractors to avail themselves to Tender for any patents or facilities whereby the extension of the Columns may be dispensed with, such alternative Designs, with complete Plans and Specifications, to be submitted to the Engineer, and approved by him prior to Tendering.
No Tender necessarily accepted.
Tenders, endorsed "Gasholder—Contract No. 7," and upon the Form of Tender prescribed, to be sent to the undersigned not later than Monday, Dec. 15, 1902.

J. COLENSO JONES,
Clerk to the Council.
Council Chambers, Pontypridd,
Nov. 5, 1902.

GREAT GRIMSBY GAS COMPANY.
(INCORPORATED BY ACT OF PARLIAMENT, 1846.)

PARTICULARS AND CONDITIONS OF SALE BY TENDER OF FIVE HUNDRED NEW ORDINARY SHARES of the Nominal Value of £10 each, such Shares being a portion of Additional Capital Authorized to be raised by a Resolution passed at an Extraordinary Meeting of Shareholders, held on the 22nd of February, 1899, under the Powers of the "Great Grimsby Gas Order, 1885."

NOTICE is Hereby Given, that the Directors of the Great Grimsby Gas Company are prepared to receive sealed TENDERS for 500 NEW ORDINARY £10 SHARES of the Company, to be issued under the Provisional Order obtained in the late Session of Parliament, 1885.
The Original Capital of £95,500, created under the Acts of 1846 and 1867, having been absorbed in providing for the requirements of the Company's district, and further Capital being required, a Provisional Order was obtained by which power was granted to raise an Additional Capital of £80,000 in New Ordinary Shares or Stock, or New Preference Shares or Stock, and £20,000 on Mortgage.
The Capital of the Company is now as follows:

Under the Act of 1846.—Class "A" and "B" Stocks fully paid, with a standard rate of Dividend of £10 per cent. per annum ...	£16,500
Under the Act of 1867—Class "C" Stock, subject to a Sliding-Scale up to £10 per cent. per annum, and now paying £10 per cent. per annum.....	£79,000
Under the Great Grimsby Gas Order, 1885, 1705 New Ordinary £10 Shares now paying £9 10s. per cent. per annum	£17,050
£20,000 £4 per cent. Preference Stock	£20,000
	£132,550

The portion of Capital now offered is required for the extension of the Company's Work generally, which is rendered necessary by the continued increase in the make of Gas, also for the supply of Automatic Meters and Cooking-Stoves, of which a large number have been fixed during the last Three Years, and a considerable quantity are now on order.
The Capital now offered will be entitled to a Dividend at the rate of 7 per cent. per annum when the price of gas is 3s. 3d. per 1000 feet, the dividend to be increased or diminished 5s. in the £100 per annum for every penny increased or diminished in the price of gas. The Shares now to be issued will be entitled at the time of issue to a dividend of £9 10s. per cent. per annum—the price of gas charged by the Company being now 2s. 5d. per 1000 cubic feet—to be diminished or increased as above.
The above Dividends are all regularly paid, and in addition the Company has a Reserve Fund with respect to the Original Capital of £9500 and on the New Capital of £2367 10s. is set apart, which is a guarantee for future Dividends.
The price of Gas to be charged by the Company under the Provisional Order is not to exceed Three Shillings and Ninepence per 1000 cubic feet.
The clauses in the Provisional Order affecting the Dividends on the New Capital are given in the Form of Tender.
The Dividends allowed by the Company's Acts have been maintained; and the Directors have every reason to believe will continue to be paid to the respective classes of Shareholders.
"The Great Grimsby Gas Acts, 1846 and 1867," and "The Great Grimsby Gas Order, 1885," can be inspected at the Office of the Company; and it must therefore be for all purposes assumed that the respective purchasers have satisfied themselves as to the provisions of the said Acts and Order.
Sealed Tenders must be sent, addressed to the Secretaries, St. Mary's Chambers, Great Grimsby, so as to reach them not later than Twelve o'clock noon on Monday, the 15th day of December next; and no Tender will be received unless upon the printed form to be obtained on application, at the Offices, to the Secretaries.

By order,
GRANGE AND WINTRINGHAM,
Secretaries.
Offices: St. Mary's Chambers,
Great Grimsby, Nov. 12, 1902.

GASHOLDER TANKS.

THE Coventry Corporation Gas Committee invite TENDERS for the construction of Two CONCRETE and BRICK GASHOLDER TANKS at their Foleshill Works. The Internal Diameter of each Tank to be 151 ft. 6 in., by 30 ft. 9 in. deep.
Drawings may be seen and Specification, with Form of Tender, obtained from the undersigned on payment of One Guinea, which will be returned upon receipt of a *bonâ-fide* Tender.
The Committee do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, addressed to the Chairman of the Gas Committee, Gas-Works, Coventry, and endorsed "Tender for Gasholder Tanks," to be delivered on or before Saturday, Nov. 22, 1902.

FLETCHER W. STEVENSON,
Engineer and General Manager.
Gas-Works, Coventry,
Oct. 31, 1902.

TO ENGINEERS AND IRON FOUNDERS.

THE Coventry Corporation Gas Committee invite TENDERS for the supply and delivery of about 117 Tons of IRONWORK required in the construction of Two GASHOLDER TANKS at their Foleshill Works.
Specification and Form of Tender may be obtained on application to the undersigned, and prints of the Drawings will be supplied upon payment of One Guinea, which will not be returned.
The Committee do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, addressed to the Chairman of the Gas Committee, Gas-Works, Coventry, and endorsed "Tender for Ironwork for Gasholder Tanks," must be delivered on or before Saturday, Nov. 22, 1902.

FLETCHER W. STEVENSON,
Engineer and General Manager.
Gas-Works, Coventry,
Oct. 31, 1902.